

23836 A PROGRESSIVE
GEOGRAPHY

BY

C. B. THURSTON, B.Sc., F.R.G.S.

KILBURN GRAMMAR SCHOOL

Author of 'An Economic Geography of the
British Empire' etc

BOOK III
AMERICA



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A PROGRESSIVE GEOGRAPHY

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C. B. THURSTON,
D.S., F.R.C.S.

- ^{BOOK}
I—THE HOME REGION AND THE
HOME LAND
II—AFRICA AND AUSTRALASIA
III—AMERICA
IV—EURASIA
V—THE WORLD

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Australia follows naturally, affording many comparisons with Southern Africa, but introducing a new "colour problem," while *New Zealand* makes a very interesting and relatively simple geographical study suitable for the early part of the course.

Book III deals with *America*, affording examples for wider study of physical and climatic factors, and of human societies varying from the most simple to the most complex.

Book IV deals with *Eurasia*, where physical and political geography are more complicated than in any other of the continents.

Book V is a revision course of *World Geography* in which the earlier studies are co-ordinated and more detailed treatment is given to those parts of the work which have been dealt with in a rather more elementary manner in the earlier years.

It is assumed that pupils will have some knowledge of the means of livelihood and industrial processes so that such expressions as "farmers," "nomads," "coal mining," "textile industries" may be something more than words when used in later stages of the work. So also such ideas as contour lines and actual temperatures which can be studied first-hand are introduced early, leaving more generalized ideas such as isotherms and formal "natural regions" till the pupils are better able to grasp their meaning.

It is assumed that pupils will not have more than the usual but rather inadequate two lesson periods a week to devote to geographical studies, but those who are more fortunate will find ample scope for further work in the questions and exercises attached to each chapter. This feature will also make the series well adapted to the needs of those working on individual lines.

Access to a good atlas and to pictorial illustrations of various kinds is assumed.

C. B. T.

LONDON,
January, 1928.

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PREFACE

This series is not an experiment, but rather the outcome of many experiments to find a course of geographical teaching suited to the needs of the majority of the pupils of a section, that is those who enter the school and stay for five years, and about two lesson periods a week to geography.

The course has two objects, the former being regarded as the more important

(1) to arouse an active and intelligent interest in the world, its peoples and their problems,

(2) to give a sufficient knowledge of the technique of the subject to enable pupils to pass the General School Examination at the end of the course and to carry their studies of formal geography to a higher stage if they so desire

Book I covers the first year's course and deals with the school locality and the *British Isles*, the author believing that without a clear understanding of the principles of geography as shown by first hand examples the study of distant lands is bound to be of little permanent value

Book II commences the continental studies with *Africa*, this being chosen on account of

- (1) the relative simplicity of its physical structure,
- (2) the symmetry of its climate and vegetation belts,
- (3) the close relationships it exhibits between geographical environment and human activities,
- (4) its striking contrasts with the homeland,
- (5) the large British interests in Africa, affording examples of the various activities of white men in the lands of other peoples

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The treatment is progressive, becoming more detailed and bringing in more difficult ideas as the pupils advance in age. In the earlier stages more attention is given to means of livelihood and industrial processes so that such expressions as "farmers," "nomads," "coal mining," "textile industries" may be something more than words when used in later stages of the work. So also such ideas as contour lines and actual temperatures which can be studied first-hand are introduced early, leaving more generalized ideas such as isotherms and formal "natural regions" till the pupils are better able to grasp their meaning.

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CONTENTS

CHAP.	PAGE
I AMERICA : INTRODUCTORY	7
II SOUTH AMERICA PHYSICAL FEATURES	9
III THE CLIMATE OF SOUTH AMERICA	17
IV NATURAL VEGETATION, ANIMALS AND NATIVE PEOPLES OF SOUTH AMERICA	27
V EUROPEAN DISCOVERY AND DEVELOPMENT OF SOUTH AMERICA	39
VI BRAZIL .	45
VII ARGENTINA	50
VIII CHILE	55
IX PARAGUAY, URUGUAY AND THE FALKLAND ISLANDS .	59
X BOLIVIA AND PERU	62
XI THE NORTHERN STATES OF SOUTH AMERICA	67
XII NORTH AMERICA : PHYSICAL FEATURES	72
XIII THE CLIMATE OF NORTH AMERICA	85
XIV NATURAL VEGETATION AND WILD ANIMALS OF NORTH AMERICA	96
XV HISTORY AND PEOPLES OF NORTH AMERICA	102
XVI THE DOMINION OF CANADA INTRODUCTORY	112
XVII EASTERN CANADA	114

CHAP		PAGE
XVIII	THE PRAIRIE PROVINCES OF CANADA .	122
XIX	WESTERN CANADA	127
XX	THE WATERWAYS AND RAILWAYS OF CANADA	132
XXI	NEWFOUNDLAND	140
XXII	THE UNITED STATES OF AMERICA : INTRO- DUCTORY	144
XXIII	WESTERN U.S.A.	146
XXIV	THE CENTRAL AND SOUTHERN STATES OF THE U.S.A.	153
XXV	NORTH-EASTERN U.S.A.	164
XXVI	COMMUNICATIONS OF THE UNITED STATES	177
XXVII	Mexico	184
XXVIII	CENTRAL AMERICA AND THE WEST INDIES	188

AMERICA

CHAPTER I

AMERICA INTRODUCTORY

Although it is so common to hear in conversation or to read in newspapers the word America used to indicate the country whose full title is The United States of America it should be remembered that the name America really belongs to a great continent much larger even than that most important country (Fig. 1)

America extends from well within the Arctic Circle to within 10 degrees of the Antarctic Circle and is a land mass second only in size to the continent of Asia. Owing to the narrowness of the Isthmus of Panama, where the great Pacific Ocean which borders America on the west approaches to within 50 miles of the Atlantic, which washes its eastern coasts America is often regarded as two continents, but we shall learn that both North and South America have much in common.

America is sometimes spoken of as The New World, for five centuries ago nothing was known of it by the civilized peoples of Europe and Asia whose history could be traced back for thousands of years and who therefore regarded themselves as inhabitants of the Old World. The much earlier trans-Atlantic voyages of the Norsemen had been forgotten when Columbus startled the Old World with his great news in 1492. Later voyages showed how thinly peopled was this vast new continent and the peoples of Western Europe were eager to avail themselves of the great opportunities for trade and colonization which it presented.

How these white men and their descendants have used

the vast resources of America, developing a number of rich and powerful countries with promise of a still greater future, we shall learn in later chapters



FIG 1—America

QUESTIONS AND EXERCISES

1 Through how many degrees of latitude does America extend? How many miles is this? What portion of the earth's circumference?

2 What are the most easterly and most westerly points of America respectively? What is the longitude of each? What is the time difference between them?

3 Compare the area and population of America with those of Africa and Australia respectively. Draw diagrams.

America 15 million sq miles, 170 million people

Africa : 11½ " " 140 " "

Australia 3 " " 5½ " "

4 Find from your atlas map which European countries have still possessions in America. Which countries of America are independent?

CHAPTER II

SOUTH AMERICA PHYSICAL FEATURES

A glance at the map will show that the most prominent feature of this continent is the great chain of mountains that run the entire length of the continent from north to south along the west coast. These are the Andes. To the east of them are lowlands drained by the great rivers Amazon, La Plata Orinoco, and their tributaries, while further east still come the broad plateaus of Brazil and Guiana.

FOLDED MOUNTAINS HOW THEY ARE FORMED

The Andes are one of the best examples in the world of a folded mountain region, and we will try to understand how such mountain systems have been formed. It is now commonly believed that our apparently solid earth was once probably in a molten state, a huge globe of fiery liquid moving through space and surrounded by vapours and gases. In time its surface cooled sufficiently to become solid, but that it has not yet completely solidified throughout we are reminded every time a volcano bursts into eruption. The hardened crust did not cool down smoothly, for it was composed of various materials cooling at different rates. It consequently hardened into ridges and hollows which, although no larger in proportion to the size of the earth than are the ups and downs on the peel of an orange to the orange itself, were still very considerable. While the crust was solidifying into hard rocks, such as granite, the vapours and gases around the earth were also cooling and eventually water rained down upon the earth filling up the hollows forming lakes and seas, above which rose the upstanding rock masses as hills and mountains.

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After this, there began the constant circulation of water as we know it to day. The water, vaporized by the heat of the sun, rises into the air, becomes cooled, forms clouds, falls as rain forming streams and rivers which return to the sea. Heat and cold, running water and moving ice, wind and rain, all help to break up the solid rock and carry down the fragments into lakes and seas, there forming new rock layers of different kinds, e.g. sandstones, clays, shales. After living creatures appeared in the waters on the earth's surface, their shells and bones also accumulated on the bottom of seas and lakes, forming still further rock layers, such as limestones. When vegetation began to grow on the solid ground even its remains of leaves and stems and trunks accumulated to form yet other "rock" layers. Coal began to form in this way.

But the solid crust of the earth was not at rest, and as we know by disastrous earthquakes that still occur from time to time, it has not completely settled down even yet. As the heated interior probably tends to shrink as it cools, the crust tries to adjust itself to the changes taking place beneath it, in much the same way as can be observed in a milk pudding when it is taken from the oven. Parts of the earth's crust beneath the seas are sometimes lifted right out of the water, while parts of the dry land became submerged. An examination of the rocks in different parts of our own country and others shows that this process must have occurred again and again. Sometimes the rock layers were uplifted almost horizontally as they were formed, sometimes they were simply tilted in one direction, while sometimes the rock layers were crumpled up in folds just as one might crumple up a thick tablecloth by placing both hands upon it at some distance apart and then gradually bringing them closer together. The rock layers often resisted these movements and became broken or "faulted" in the process, while in places the lower and therefore older rock layers became

completely overturned, so that they rest now upon rocks of more recent formation.

Through the "faults" formed in the rock layers as described some of the molten material from the earth's interior would often be squeezed out in great lava flows, or even violently erupted, piling up a huge conical heap of rock matter around the vent or "crater," as it is called (Fig 2).

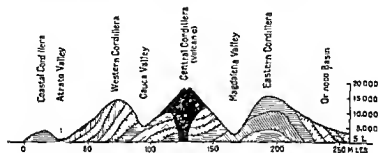


FIG 2—Rough section across the Andes in Lat 5° N. showing the Cordilleras formed by folding of the rock strata, and the volcanic material which has burst through the rock layers, forming the highest part of the chain

THE ANDES

The Andes exhibit the results of all the kinds of movement that have been described. In Colombia, in the north, the parallel folds of ridge and valley are very well marked, although it must be remembered that each of the ridges of high land shown on a small scale map, such as that in your atlas, may itself consist of many folds. Notice the roughly parallel downfolds which form the valleys of the Magdalena and Cauca Rivers, and the parallel ridges or "*Cordilleras*," which separate them (Fig. 2).

Further south the ridges are closer together and near the Equator they seem to come together in a tangled ' above which rise the volcanic cones of Co Chimborazo, the former still active, both "

and both about four miles above sea level. In Peru the ranges again separate and the great upper tributaries of the Amazon occupy the valleys between them. In Bolivia the eastern cordillera is separated from the western by a broad high plateau, which is about two and a half miles above sea level while the Andean giants such as *Sorata*, tower another two miles above it. On the plateau lies the great *Lake Titicaca*, which receives much of the drainage of the *Plateau of Bolivia*.

In Chile the Andes reach their greatest height in the

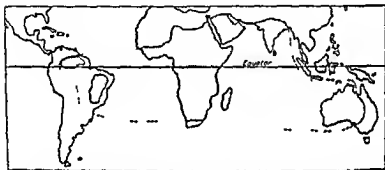


FIG. 3.—The similar unfolded plateau lands of South America, Africa, Asia and Australia which are believed to have formed a continuous continent in ancient times.

extinct volcano of *Aconcagua* (23,000 feet) and continue as a single chain to the extreme south of the continent. The islands off the coast of southern Chile probably represent the remains of an outer chain which has been cut off by a sinking of the land letting the sea through the old river valleys across the range into the downfold behind it. The similarity of this coastal region to that of south western New Zealand should be noted, the long narrow, winding and steep-sided fiords being the drowned valleys of old glaciers, the remains of which still fill the higher valleys of the Andes.

Throughout their length the western cordilleras rise very steeply from the deep Pacific Ocean, and except in

southern Chile there are few harbours of any use to shipping. The descent from the eastern cordilleras to the plains is also steep, and as the lowest pass across the Andes—the Uspallata—exceeds two miles in height, they are a very real barrier to intercourse. But the folding and faulting of the rock layers of the Andes have brought to the surface many rich mineral veins, especially in Peru, Bolivia and Chile, and these form the chief source of wealth of those countries.

Earthquakes of greater or less intensity are of almost daily occurrence still throughout the Andean region, and most of the cities have suffered severely at some period in their history from this cause.



FIG 4—A tilted and faulted plateau like the Brazilian Highlands. Note the steep escarpments which appear like mountain ranges from below.

THE PLATEAUS OF BRAZIL AND GUIANA

These are believed by geologists, who have studied the rocks, to have been connected at some very remote period of the earth's story with the plateaus of Africa, Arabia and Australia, which they greatly resemble in structure (Fig 3). Their rock layers are either horizontal or simply tilted and faulted but not folded, and they have probably been high and dry above sea level for a much longer period than the high folded cordilleras of the Andes. As in all plateau regions the rivers have cut deep gorges and descend from the plateau to the coast plain in waterfalls, of which the *Kaietuk Fall* in British Guiana is a magnificent example, dropping some 800 feet down the escarpment of the plateau. The Brazilian Highlands slope gently towards the central plains but present a bold escarpment to the Atlantic, from which it appears as a range of mountains (Fig 4). The drainage of

the plateau is carried off by three great rivers, the *Tocantins* going northward to the Amazon estuary, the *Parana* southwards to the La Plata, and the *Sao Francisco* direct to the Atlantic. As in Africa the outstanding masses of the plateaus are flat topped, and both areas contain rich mineral deposits in their ancient rocks.

THE GREAT RIVER BASINS

It seems probable that at one time there flowed a great sea between the western cordilleras and the eastern plateaus. In time this became silted up with the débris weathered from the highlands on either side and carried down by the rivers. A subsequent elevation of the whole area has thus given rise to the central lowlands over which now flow the great rivers *Orinoco*, *Amazon* and *La Plata*, still carrying on the work of transporting to the sea the products of the denudation of the highlands by wind and rain, frost and moving ice.

The Amazon is by far the greatest of these, indeed it drains a larger area of land and carries more water to the sea than any other river in the world. Ocean going ships can sail up it for more than 1,000 miles, and smaller vessels can proceed 2,000 miles further upstream without hindrance to where its great tributaries come tumbling down the eastern face of the Andes. As its course lies almost along the Equator it receives constant supplies of rain, and is always full. Indeed it brings down so much fresh water that a day before a ship reaches the estuary coming in from the Atlantic the vessel passes out of the salt ocean water into the fresh river water, which being less dense floats upon its surface. Tree trunks and other vegetation from its forested banks are also carried hundreds of miles out to sea by its powerful stream, and the mud brought down by the river in the course of ages has built up in its estuary deltaic islands equal in area to half England.

The La Plata is just the joint estuary of the *Parana-*

Paraguay and *Uruguay* Rivers, which drain the southern part of the lowlands. Like the Amazon these rivers fall very gently in their long courses through the plains, and form very useful highways of communication. So low is the watershed between the sources of the Paraguay and the Tapajos tributary of the Amazon that in flood seasons they are joined by a marshy lake. This river system, unlike the Amazon, flows across instead of along the lines of latitude, and therefore crosses areas differing in climate and productions. Its commercial usefulness is therefore considerably greater, although it is a smaller river.

The *Orinoco* though small in comparison with the Amazon is still a very big river, but its volume varies greatly between the hot season, when it is in flood and overflows its banks, and the cool season, when it is often very low. It is also impeded by a delta at its mouth. Find on your map the little *Cassiquiare* tributary and notice the curious fact that it is also a tributary of the Rio Negro which flows to the Amazon so that it is possible to pass at any rate in a small boat, from one river system to the other. A slight lowering of the bed of either river might one day cause a considerable change in the courses of the rivers in this region. The Negro may "capture" the Orinoco, or vice versa.

In the south of Argentina are a number of other large rivers, which in a country less richly endowed in this respect would be of great importance and which even here will become more valuable as the country develops.

QUESTIONS AND EXERCISES

1 Through how many degrees of latitude does South America extend ? What are its greatest length and breadth respectively ?

2 Draw sections across South America (a) along the Equator, (b) along the Tropic of Capricorn, to show the three great physical divisions

3 Why would you expect volcanic activity in the Andes ?

4 Which part of Africa can be compared with the Andes ? How ?

5 Compare the position and physical features of Southern Chile with those of the South Island of New Zealand

6 Contrast the rivers of South America with those of Africa and Australia respectively

7 It is necessary to journey 3 000 miles up the Amazon before reaching the 600-feet contour line Calculate the average fall of the river in inches per mile

8 Can you suggest any reason why the delta of the Orinoco is more complete than that of the Amazon ?

9 Near what meridian do the British possessions in and near South America lie ? What will therefore be the time there when it is noon in Britain ?

10 Compare the height of the highest mountains in the Andes with the earth's diameter Try to draw a diagram to scale

CHAPTER III

THE CLIMATE OF SOUTH AMERICA

South America being such a large continent experiences considerable differences in climate in its various parts, but we shall see that in this respect it is very similar to Africa, for the reasons we have previously studied

TEMPERATURE

We have already learnt how temperatures depend upon distance from the Equator and upon height above sea level, and it is easy to give examples from South America to illustrate this. Thus the mean annual temperature of Manaus on the Amazon is 79°F , of Rio de Janeiro 73°F , of Valparaiso 58°F , and Valdivia 53°F , none of these being any considerable height above sea level. But Quito, which is nearer the Equator than is Manaus, has a mean annual temperature of only 55°F , the twenty four degrees of difference being due to the fact that Quito is more than 9,000 feet above sea level.

To see how temperature varies throughout the year in different parts of South America we will study the *Isotherm Maps* (Figs 5 and 6). These are made in the following way. Daily maximum and minimum temperatures are observed at many places, as we have already learnt. From these it is possible to calculate average mean monthly temperature for any month for each place. If such mean temperatures are set down on the map in the places to which they refer, it is possible to draw lines through those places which have the same temperature, in an exactly similar way to that in which contour lines are drawn through places which are the same height above sea level. The lines of equal temperature on the map are called *isotherms*. A moment's thought will

show that if there were a highland area on the map it would be necessary to have a whole series of isotherms corresponding with the gradual falling off of temperature as the height above sea-level increases. To avoid the vast number of isotherms that this would necessitate on

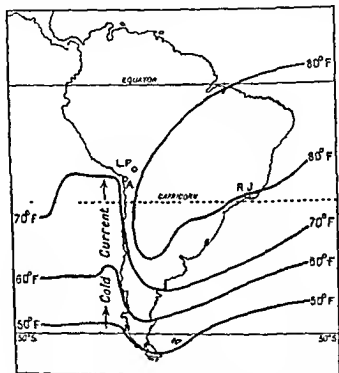


FIG. 5—January Isotherms. Temperatures "reduced to sea-level"

such a map as South America it is usual to apply a correction to the temperatures before they are placed on the map. Thus if the temperature of the place is known and also its height above sea-level, the temperature has a number of degrees added to it in order to make it what it probably would be if the place were at sea-level. All

the temperatures having been thus "reduced to sea-level," as it is called, the resulting isotherm map is much simpler and more instructive, provided we remember exactly how it has been made

Thus the Isotherm map for January shown in Fig 5

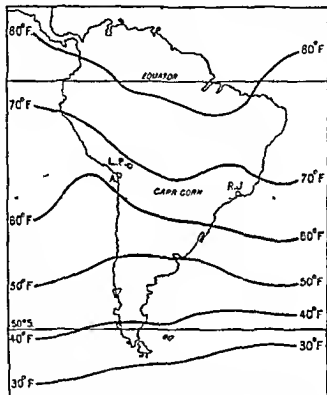


FIG 6.—July Isotherms. Temperatures reduced to sea level.

indicates that in that month the hottest part of the continent is eastern Brazil, while the coolest is around the Strait of Magellan. This is because at this season the sun is vertically overhead at mid-day, a little to the north of the Tropic of Capricorn—where it was vertical on December 22—while further south the sun is not so high

in the sky at mid day, and therefore its radiation is not so intense

The July Isotherms (Fig 6) show that in that month the hot belt has moved further northward, for then the vertical mid day sun is near the Tropic of Cancer, and the southern part of the continent is also cooler than it was in January. Of course isotherms could be drawn for the intervening months, and they would show the gradual movement of the belts of warmth and coolness following the apparent seasonal movements of the sun.

A comparison of the two maps (Figs 5 and 6) shows that there is no part of South America which experiences great differences of temperature between its hottest and coldest months, while over the greater part of the continent the seasonal differences of temperature are very small indeed. We say that South America has an *equable* climate, which is however hot in the north, while it is only temperate in the south.

It will be noticed that according to the isotherms no part of South America appears ever to have a mean monthly temperature below the freezing point (32°F), and for places at sea level this is true. But the "reduction to sea level" of the temperatures must not be overlooked. For example, according to Fig 5 the mean January temperature of La Paz, the capital of Bolivia, which is more than 12,000 feet above sea level, appears to be about 75°F , whereas it is actually only 52°F , and its mean July temperature is only 45°F instead of 68°F , as would appear from Fig 6. Lake Titicaca, in its neighbourhood, has been known to be frozen over, and the high Andes close by are snow capped all the year round.

A further examination of the isotherm maps also shows that places which are on the coast and at the same distance from the Equator do not always have similar temperatures, as we might expect. For example Rio de Janeiro, on the coast of Brazil, has a temperature of 77°F

in January and 67°F in July, while Antofagasta, on the coast of Chile, and in the same latitude, is eight degrees colder in each month. The curious upward bend of all the isotherms off the west coast indicates that that coast is everywhere cooler than the east coast in similar latitudes. This is due to a cold current from the Antarctic Ocean flowing northward along the west coast close to the shore. We shall learn more about this and other ocean currents later on.

RAINFALL AND WINDS

Fig 7, showing the Mean Annual Rainfall in South America indicates that in the north of the continent the wettest parts lie to the east, while in the south they lie to the west. Remembering what we have learnt about the great wind belts of the globe in connection with Africa, this is easy to understand. Within the Tropics the Trade Winds blow, coming from the north east to the north of the Equator, and from the south east south of the Equator, and moving as vast air currents from cooler regions towards the equatorial belt of high temperature and low air pressure. These winds come moisture-laden from the Atlantic and meet over the Amazon Basin, causing each other to rise and be cooled so that their moisture descends in torrential downpours just as in the Niger and Congo Basins in Africa. The hot wet belt moves northward and southward with the vertical mid day sun. The northern coastlands of South America being all so near the Equator, get rain practically at all seasons, but in the southern parts of Brazil and the neighbouring states the rainfall is heavy in the hotter months (October-March), and lighter in the cooler half of the year.

It is interesting to note the rather dry area in the Brazilian Highlands. This is partly to be explained by the configuration. The South east Trades are forced by the high eastern edge of the plateau, which gets in

rain in consequence, but as the plateau slopes down inland towards the Amazon Basin the winds there descend and becoming warmer tend to pick up rather

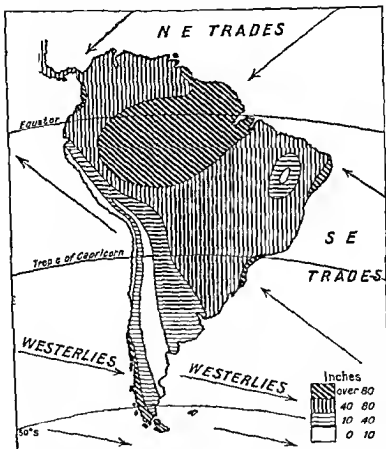


FIG 7—Mean Annual Rainfall of South America.

than deposit moisture till they are once more forced upwards on meeting the North east Trades

The Equatorial area of heavy rainfall is more extensive

in South America than in Africa for two main reasons - (1) Both Trade Winds reach South America from the Ocean, while in the case of Africa only one does so; (2) most of South America in the Trade Wind Area slopes much more gently from the ocean to the highlands than is the case in Africa

When the Trade Winds have crossed the High Andean cordilleras there is little moisture left in them, and consequently along the coast of Peru and Northern Chile is the long narrow desert of Atacama, where often not a drop of rain falls throughout the year. Compare its position with the deserts of South Africa and Australia, which result from similar conditions. Note that the Tropic of Capricorn runs through them all. At the times

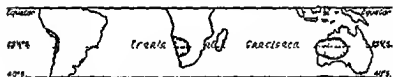


FIG 8.—The West Coast Deserts of the Southern Hemisphere—Atacama, Kalahari, Australian

of the year when the Trade Winds are not blowing these deserts lie in the Belt of Calms, which separate the Trade Winds from the Westerlies, and so their drought is intensified (see Fig 8)

The wet region of Southern Chile is easy to explain. It lies in the broad belt of stormy westerly winds, which are always to be found beyond latitude forty, causing sailors to speak of those latitudes as the "*Roaring Forties*." Coming from the Pacific the west winds are forced to rise over the southern Andes and leave most of their moisture as snow or rain on the western side. There is little left for Patagonia on the eastern side of the chain, and as it also has a very stony soil it is practically a desert, although the drought is never so complete

there as in the desert of Atacama. As the winds descend to the plains on the lee side they are warmed by compression (just as they are cooled by expansion in ascending the windward slopes) and these warm dry winds are a blessing to the shepherds of the region, for they keep the pastures sufficiently clear of snow in the winter months for the herds to remain in the open.

Between the Atacama Desert of Northern Chile and the wet region of Southern Chile lies a region with a delightful climate similar to that of the Mediterranean Region. Its summers are hot, but the heat is tempered by the cold current, of which we have already learnt (page 21). During this season it lies either in the Belt of Calms or receives the South east Trades, which have crossed the Andes and are therefore quite dry. These hot dry summers bring to perfection the corn and fruit watered by the mild winter rains which are caused by the northward movement of the West Wind Belt at that season. It will be remembered that in South Africa and Australia there are similarly situated regions with similar climate.

CLIMATIC REGIONS OF SOUTH AMERICA

Summarising what has been learnt about the temperature and rainfall of South America we can divide the continent into the following well marked Climatic Regions (Fig. 9)

1 *The Equatorial Lowlands*, hot and wet at all seasons, with frequent thunderstorms, and heaviest rains near the time of the equinoxes.

2 *The Tropical Regions*, with very hot and wet summers and warm but drier winters, the higher parts being cooler at all seasons.

3 *The Desert of Atacama* hot and dry at all seasons.

4 *The La Plata Region*, with hot summers, mild winters and most rain in summer.

5. *Central Chile*, with hot droughty summers and mild winters with moderate rainfall a "Mediterranean" climate.

6. *Southern Chile* has warm summers, cool winters, and heavy rainfall at all seasons.



FIG. 9.—Climate Regions of South America
(see opposite page)

7. *Patagonia* has warm summers, cool winters, and very little rain.

8. *The Andes* have temperature varying with latitude and elevation, and rain and snow varying with direction of prevailing winds in different parts of the chain.

QUESTIONS AND EXERCISES

- 1 What are the mean January and July temperatures of Para at the mouth of the Amazon? Why do they differ so little?
- 2 Assuming that temperature on a mountain falls about 1° F. for a rise of 300 feet in elevation above sea level, how high must one ascend Mt Aconcagua in January before reaching the snow-line? About how much of the mountain is snow-capped?
- 3 The Uspallata Pass near Valparaiso is 11,000 feet above sea level. Is it ever likely to be snowed up, and if so when?
- 4 How do the mean January and July temperatures of Buenos Aires, the capital of Argentina, compare with those of your own town or of London? Account for the difference.
- 5 Why does midsummer come at Christmas in the southern hemisphere?
- 6 Why is the mean annual temperature of Rio de Janeiro greater than that of Valparaiso?
- 7 Quito on the Equator is said to have a climate like perpetual spring. Explain this.
- 8 In what latitudes do the regions with a "Mediterranean" type of climate lie? On which side of the continent are they? How do the regions in similar latitudes, but on opposite sides of the continents, differ from them in climate?
- 9 Describe and explain the climate of the Plateau of Bolivia.
- 10 Describe the gradual changes in climate one would experience in traversing the west coast of South America, (a) in January, (b) in July.
- 11 Describe the climate of the Falkland Islands. To what part of Great Britain are they similar in this respect?
- 12 What parts of Africa and Australasia have a climate similar to that of (a) Central Chile, (b) Argentina, (c) the Brazilian Highlands, (d) the Amazon Basin, (e) the Desert of Atacama, (f) Southern Chile, (g) British Guiana respectively?

CHAPTER IV

NATURAL VEGETATION, ANIMALS AND NATIVE PEOPLES OF SOUTH AMERICA

As in our previous studies of Africa and Australasia we shall find that climate is the chief factor in determining the natural vegetation of the continent. Where there is plenty of rain and sufficient heat we shall find forests the kind of trees and thickness of the undergrowth depending largely upon the temperature in different parts. Where the rainfall is less or falls mainly in one season, trees become fewer and smaller, while as conditions of temperature and rainfall become still more difficult they cease to grow and give way to scrub and grassland which in its turn gives way to the deserts where no vegetation grows at all (Fig 10). It is interesting to notice that there is a somewhat similar succession of vegetation as we pass from equatorial regions towards the poles as that noticed in ascending a high mountain within the tropical regions where we pass gradually from the tangled jungle at its foot to the bare rock of its summit.

Each type of vegetation has usually associated with it its own species of animals and as human beings are dependent for food on vegetable and animal life we often find the lives of primitive peoples determined by the character of the vegetation of their homelands.

THE SELVAS OR AMAZON FORESTS

These not only cover a larger area than any other type of vegetation in South America but are easily the biggest forest area in the world being much more extensive than the Congo and Niger Forests of Africa. Like

them however they consist of tall trees which in places rise like the vaulted arches of a cathedral but in others seem to be hushed together in a tangled mass by the thick stems of climbing plants. The hot steamy atmosphere is like that of the tropical houses at Kew Gardens where many of the plants but not the forest giants, may be seen growing under artificial conditions. The forest is shrouded in gloom the sunshine being excluded by the thick foliage overhead, and the only sounds that break the eerie silence are the dripping of water from the trees the splash of fish or water fowl in the rivers or the shrill cry of birds and monkeys in the tree tops. Along the great river and its tributaries which form the only easy and sunny pathways through the forest feathery palms and trees with foliage and blooms of extraordinary brilliance come down to the water's edge while huge and gorgeous butterflies and tiny humming birds skim over the surface flashing in the sun. The rivers abound in fish of all sizes and colours while alligators, huge snakes and other reptiles are commonly seen on the banks. The only animal of any size in these forests is the harmless tapir, which is about as big as a large pig and has a snout that looks like a very short trunk. Hosts of monkeys, great and small sport in the trees the nuts for which Brazil has long been famous providing them with food. Parrots toucans and other birds of brilliant plumage also abound while the air is full of mosquitoes and other insects which help to make life a misery for human beings.

The natives of the Selvas are few and have not reached a very high stage of civilization having probably been driven into these uncongenial regions by stronger and better organized tribes. Like all the other aboriginal peoples of America they are still called Indians the name given to them by the first Spanish and Portuguese explorers who thought they had reached eastern Asia when they first crossed the Atlantic. The Indians of

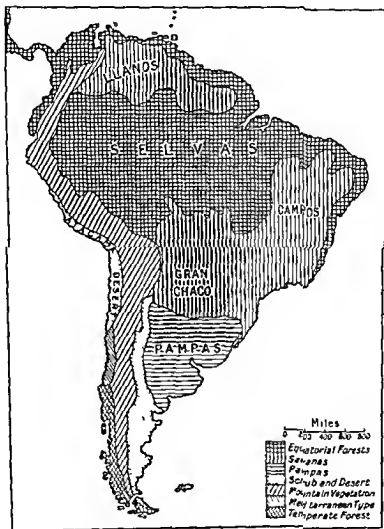


FIG. 10.—Natural Vegetation of South America

the Amazon basin are mainly short brown people with rather gloomy features they usually have straight black hair worn with a fringe on the forehead and longer at the back the men have no hair on the face Tattooing of the face is fairly common, especially with the women, and the slitting of ears, noses and lips for the insertion of disfiguring stone, bone or feather "ornaments" is practised by some of the tribes Little clothing is necessary and houses vary from simple shelters made of twigs and grass to considerable sized houses, which are usually oblong in shape, thatched with leaves or grass and open at the end, and big enough to shelter a family or even a whole tribe

Wooden clubs and wooden bows and arrows, the latter tipped with sharpened bone or stone, are the chief weapons of these peoples, and with these they capture birds, monkeys and fish, which provide their principal food-stuffs Some tribes use a blow gun or long hollow bamboo rod instead of the bow for "firing" their arrows, which are often dipped in the juice of some poisonous plant

Their flesh diet is varied with fruits and roots of the forest plants, and some of the more advanced tribes cultivate patches of maize and sweet potatoes in clearings of the forest Maize meal and the grated root of the manioc plant are used for making a kind of cake or bread The use of the tobacco plant for smoking and making snuff is known to most of the tribes, and the beans of the native cocoa plant are chewed

Most of the people are wanderers, moving from place to place in search of food in their canoes, made either by binding strips of bark together with the natural cordage of the forest climbers, or by hollowing out fallen tree trunks such as may always be found drifting downstream This life gives them little opportunity to practise arts and crafts and so they make little progress Their principal ornaments consist of necklaces of bones

or teeth or beans of varied shapes and colours, or head dresses made from the brilliant coloured feathers of the forest birds. Some have learnt to make coarse cloth from bark or woody fibres and to weave baskets and hammocks from reeds and grasses, while a few of the tribes make pots and pans of sun dried mud.

The Indians are naturally suspicious of outsiders, but some have learned to associate with the traders and help in the collection of nuts, rubber and timber, or the cultivation of tropical plants, of which we shall learn more later on.

THE FORESTS OF SOUTHERN CHILE

These differ greatly from those of the Amazon, and if anything are rather less known. They cover hills and mountain sides in a climate where the sun is seldom seen on account of thick clouds from which the rain descends in daily downpours. The stormy westerly winds and the cold Antarctic current also make the district most inhospitable, and although the tall pines, beeches and cedars provide splendid timber the forest has so far not been greatly disturbed. The few native Indians of the coast lands and islands are very poor, as agriculture is impossible in such a wet climate, while without steel tools clearing the land for pasture is very difficult. They live mainly on fish and the flesh of sea lions which they hunt with harpoons from the canoes, in which they spend much of their lives. A fire, lighted by knocking stones together, is usually kept burning in a clay fireplace in the canoe and serves both for warmth and to cook the fish. Tierra del Fuego, which means Land of Fire, was so named by the Portuguese explorer Magellan on account of the number of fires in the canoes and on the shore noticed on his famous journey to this region.

THE SAVANA LANDS

Lands of this type, where the rainfall is scanty or seasonal and therefore does not encourage thick tree growth, are found in various parts of South America. The *Llanos* of the Orinoco Basin are of this kind—open grassland with clumps of trees along the waterways, or where a stretch of soil holds up water through the dry season, while where the soil is more porous the country takes on a semi-desert appearance in the dry season. The savanas also extend to the Guiana Highlands. On the southern side of the Amazon Forests are the savana lands known in the Brazilian Highlands as the *Campos*, and in Paraguay and Argentina as the *Gran Chaco*. Large areas of the latter consist of forests of palm trees. One useful tree of this region is the *yerba maté*, whose dried leaves provide the "Paraguay tea," one of the characteristic drinks of South America.

These savanas are not very rich in species of animals, and have none like the cattle of the African savanas which could be domesticated. There are species of deer and peccaries, animals like tailless pigs with bristly hair, which feed on the vegetation, and also a few flesh-eating animals, such as the puma and jaguar, which prey upon them.

Thus, although these regions are fertile if cultivated and now support many cattle which have been introduced from Europe, in their original state they produced little foodstuff for human beings. They were therefore very thinly peopled indeed by a few Indians who got their living chiefly by hunting. Some of the tribes further from the settled districts still live in their primitive conditions, wearing little clothing and knowing little of houses or home life.

THE PAMPAS

These are the great treeless grasslands of the middle and lower parts of the La Plata Basin. Although the

summer rainfall is too scanty to support trees it is sufficient to produce the luxurious feathery pampas grass, which is often tall enough to hide a horse. In spring the hundreds of square miles of the Pampas are beautifully green, gradually changing to delicate shades of red and purple as the flowery heads of the grass develop in the summer months. In the autumn the white fleecy plumes stand out above the brown and withered stems. Near the rivers these wonderful natural grasslands have become great pastures and granaries to supply the Old World with meat and bread, and we shall learn more of them later. Farther inland, however, vast areas remain in their wild state as the homes of the *rhea*, the South American ostrich, and the *guanaco*. The latter is an animal with long legs and neck, somewhat resembling a camel, but not quite so large. Its flesh is good to eat and its soft furry skin provides clothing and tent making material for the Indians who hunt it. These tribes are good horsemen, having learned to catch and train the wild horses, which are descended from those loosed by early Spanish settlers. Their chief weapons against both the speedy *rhea* and *guanaco* are the lasso and the *bolas*. The former is a long thin rope made of plaited strips of hide, with a noose at one end. The *bolas* consists of two or three stone or metal balls cased in leather and attached to thongs about 8 feet in length. Holding one ball in the hand the hunter swings the others round and round his head and then takes aim. The thongs thus become tightly wound round the neck or legs of the animal at which the *bolas* is flung and the creature is thus brought down and captured.

The Pampas Indians, as also the *Gauchos* or Spanish half breeds, thus live a very free and open life, with poor tent like dwellings and subsisting mainly on meat and water. While the men are out hunting the women weave blankets and the thick cloak like *ponchos* from the soft *guanaco* hair, and they are also skilful in making

clothing and saddles from the hides. Many of the Indians and the gauchos, who are expert horsemen, work for the cattle ranchers in the settled districts, rounding up the animals which wander over vast areas of the pampas.

THE DESERTS

The Desert of Atacama, on the coast of Southern Peru and Northern Chile, is practically rainless, for the only winds that ever reach it are the South east Trades, which, after crossing the Andean cordilleras, are quite dry (Fig. 8). Summer temperatures are very hot and winters quite warm, but the cloudless nights are often bitterly cold and even frosty. In these conditions of course vegetation will not grow, and it is only where a river, bringing water from the melted snows of the Andes, crosses the desert strip that any crop can be cultivated at all. The soil of this desert however is rich in nitrate of soda and other materials, which make valuable plant food if dissolved in water. Lack of rain has prevented these nitrates from being dissolved and used up by plants on the spot, so that they are now available for artificial manures to be used in other parts of the world, such as our own country, where there is plenty of rain but the soil tends to become poor through having grown crops for centuries. This region of course supported neither animals nor people at one time, but the value of the nitrates makes it possible for communities of miners to live there now, buying from other parts of the world all the necessities of life with the products of their industry. Narrow gauge railways link up the mining centres with the ports, and in some cases with mining centres high up among the Andes.

The Shingle Desert of Patagonia—This lies under the lee of the Andes in the region of the westerly winds and so receives very little or no rainfall. Its rocky soil is also unfavourable to vegetation and only tufts of coarse grass are to be found in the most favoured patches. A

few scattered herds of guanaco and rhea roam over the desert and are hunted for food and clothing by the Patagonian Indians. These live in much the same way as those of the Pampas, but are, curiously, taller than any other of the native races of South America, most of them exceeding 6 feet in height. Indeed the name Patagonia is said to mean "land of the broad footed," and was given to it by the great Portuguese explorer Magellan, who had seen some of their footprints in the sand on the seashore!

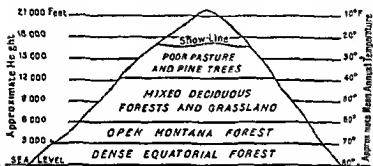


FIG. 11.—Natural Vegetation Zones on the Equatorial Andes

THE ANDEAN REGION

Just as the temperature varies in ascending from the coast or the plains to the summit of the Cordilleras, so does the vegetation (Fig. 11).

Within the tropics on the wet eastern side the tangled jungle of the Selvas gradually gives way to more open "montana" forests, containing besides invaluable timber such trees as coffee and cinchona. From the bark of the latter, often called "Peruvian bark," the useful drug quinine is extracted. Above 6,000 feet the trees resemble those of Britain in losing their leaves in winter, and there are large open spaces of grass land which give pasture for animals, or can be cultivated for maize,

wheat and potatoes, the first and last being native plants of South America. Above 12,000 feet only poor pasture is found, with occasional clumps of hardy pine trees, until the line of perpetual snow is reached, where vegetation ceases.

On the western coastlands and mountains of Colombia and Ecuador a similar succession of vegetation is found, but in Peru and Northern Chile there are no forests on the western slopes owing to drought, as we have seen. In Central Chile, where the climate in the lowlands is like that of the Mediterranean, trees are few and small owing to the intense drought of summer, but the winter rains and hot summers allow of the cultivation of fine fruit and corn. Such trees as there are protect themselves by long roots, thick bark or small tough leaves against the hot droughty summers. Above this region succeeds the poor pasture land, which extends to a height exceeding two miles above sea-level before the snow line is reached. In Southern Chile, as we have seen, the lower slopes are covered with thick temperate forests, which gradually thin out on the higher slopes, the trees becoming fewer and smaller with decrease of temperature.

The peculiar animals of the Andean region are the *llamas*. These resemble camels in their long necks, shape of head and manner of walking, but have long woolly coats like those of sheep, while in size they are about as large as the English deer. Before the introduction of horses and oxen from Europe they were the only domesticated animals of South America, being kept to supply flesh and wool, and also as beasts of burden. A llama can carry a hundredweight load slung across its back, and the animals are still used to carry mineral ores from the mines among the mountains to the nearest railway. The wool of the llama is exported, and so also is that of the *alpaca* and *vicuna*, smaller animals of the same species, which have given their names to two well-known kinds of cloth made in the mills of the West Riding of Yorkshire.

The high plateaus among the tropical parts of the Andes were the homes of the famous *Incas of Peru*, the highly civilized native race found in possession on the arrival of the Spaniards from Europe in the sixteenth century. They were peaceful farmers, keeping herds of llamas and alpacas, and cultivating maize, potatoes and fruits in the river valleys and around the lakes. They were very skilful in cheing out their rather scanty rainfall by means of extensive irrigation works, some of which are still in use. They built temples and palaces of hewn stone blocks and ornamented them with gold, silver and precious stones worked from the mountains. They were great road makers, and the outlying provinces were connected to Cuzco, their capital city, by fine roads, some exceeding a thousand miles in length. Rivers were crossed by suspension bridges made from bamboo rods attached to thick ropes of twisted reeds and strong enough to support laden animals as well as men. They knew how to make pottery from clay, and to use the wool and skins of the llamas and alpacas in making cloth and leather goods. Their implements and weapons were made of bronze, an alloy of copper and tin, two metals which are still found in large quantities in these parts of the country. They managed to live without money and without any system of writing. The forces of nature were their gods, the sun being their chief object of worship, and their rulers were supposed to have been directly descended from him. Their peaceful rule was however overthrown by the Spaniards, who though inferior in numbers were superior in their weapons and skill in warfare. The masses were so docile and subservient to their rulers, that when the latter had been destroyed by treachery the people offered little serious resistance to the conquerors.

QUESTIONS AND EXERCISES

1 What regions of Africa and Australasia have similar vegetation to (a) the Selvas, (b) the Pampas, (c) the Llanos, (d) the Chilean Forests?

2 Compare the life of the Amazonian Indians with that of the pygmies. How do these peoples differ in appearance?

3 How do the lives of the Indians of the grass lands differ from those of the forest tribes?

4 Try to see specimens of the South American animals in the Zoo or a Natural History Museum, if this is impossible try to obtain pictures of them. With what African or Australasian animals may any of them be compared?

5 Why are the natives of the South American grasslands mainly hunters while those of the African grasslands are herdsmen?

6 Why do many South African native tribes live in "kraals" while there is no similar mode of life in South America?

7 Why do you think the people of the Andean plateaus became more highly civilized than the dwellers on the plains?

8 Compare the position of the desert of Atacama with that of the African and Australian Deserts respectively. What similarities do you notice? Why is the South American desert so small compared with the others?

9 Why is there no desert in Africa or Australasia similar to that of Patagonia? Where might you have expected one?

10 Draw a diagram similar to that of Fig. II but showing the vegetation on the eastern and western slopes respectively of the Andes in Northern Chile.

CHAPTER V

EUROPEAN DISCOVERY AND DEVELOPMENT OF SOUTH AMERICA

The existence of the great southern half of the American continent was not dreamed of by the peoples of Europe till the end of the fifteenth century. A few scientists and navigators were, however, convinced that the world was a globe, and believed that if it were possible to cross the vast unknown Atlantic Ocean, the eastern shores of Asia would be encountered. Among the few was the Genoese sailor, Cristoforo Colombo, now more generally known to fame as *Columbus*. Seeking assistance from most of the crowned heads of Europe, he at last succeeded in interesting Ferdinand and Isabella of Spain in his project to reach the east by sailing west, and in August, 1492, set sail from Palos in the *Santa Maria*, the flagship of a squadron of three small vessels manned by about a hundred sailors. After innumerable trials and hardships the little fleet was carried safely across the Atlantic by the North east Trade Winds and a safe landing was effected on what is now called Watling Island, on October 12, 1492.

The only world map possessed by Columbus showed the distance between Western Europe and Eastern Asia to be far too small (see Fig 12) and the voyagers firmly believed that they had reached the Indies. Several other islands of the group, which is still called the West Indies, were visited by Columbus before he returned to Spain with his great news. He crossed the Atlantic on three subsequent voyages, but never landed on the mainland of South America, although he was convinced that a vast land mass existed beyond the islands from having

seen the mouth of the Orinoco and the great volume of water that it brought down to the sea

Amerigo Vespucci, another Italian seaman, followed up the work of Columbus, and assisted by the King of Portugal in 1502 earned out a great voyage of exploration along the coasts of Brazil, which thus became a Portuguese colony The continent itself was also named after this explorer

The Spaniards continued their conquest of the West



FIG 12 —The only chart of the North Atlantic known to Columbus, showing Japan to be where Mexico actually is Dotted lines showing the approximate position of America were, of course, not on the chart

Indies, which, however, disappointed them in lacking the vast stores of gold and silver of which they had dreamed But further investigations of the mainland of Mexico and later of Peru discovered what they sought The peaceful Incas were cruelly robbed of all their precious metals and enslaved to work in the mines to produce greater wealth for the greedy *Pizarro* and later Spanish adventurers, who soon became masters of the country. It will be remembered that the famous English sailors of Queen Elizabeth's day spent much time in waylaying and plundering the Spanish galleons home-

ward bound from the shores of the Caribbean Sea with their ill gotten gains

While Pizarro was busy with the conquest of Peru other Spaniards were busy on the east coast to the south of Brazil and had made settlements on the Pampas around the La Plata or Plate River. The name of this river, and also Argentina, the name given to the country around it, bear witness to the quantity of silver plate obtained from the native Indian tribes of the region who had obtained the precious metal from the Andes to the west

Magellan, a Portuguese sailor in the service of Spain, had reached the southern extremity of the country in 1519 and, in spite of the stormy westerlies, forced the passage of the Strait which now bears his name. Finding the great ocean he then encountered to be much more peaceful after the storms of the "Roaring Forties" through which he had just passed, he named it the Pacific Ocean. It took him over three months to cross it to the Philippine Islands, where he was killed, after which one of his ships found its way home across the Indian Ocean and round the Cape of Good Hope, thus completing the first voyage round the world.

Orellana, one of Pizarro's officers in Peru, made a memorable voyage in 1541, tracing the Amazon from the Andes to the Atlantic. He met with much opposition from Indian tribes, some of whose women he likened to the Amazons of the old Greek myths. Some say this is the reason for the name of the river, but others believe that it is named from a native Indian word meaning "boat destroyer."

By the end of the sixteenth century South America, apart from Brazil was divided into a number of Spanish colonies. The ruling classes were Spaniards, while the masses of the people were Indians living under them in a greater or less degree of slavery. Few efforts were made to develop the great natural resources of the country,

the sole aim of the rulers both in Spain and in South America being to amass as great a quantity of gold and silver as they could. A few Catholic priests endeavoured to minister to the native peoples, who must have found it difficult to harmonize their preaching with the practices of the other Spaniards.

Later came settlers from Spain who found that European corn, fruits and cattle would thrive in many parts of the country, and that in the tropical regions the natives could be enslaved to produce valuable crops of sugar and cocoa for which a market could be obtained in Europe. The settlers, however, received little encouragement from the mother country, and when the home government became weak one colony after another declared its independence. The colonies fought the troops sent out from Spain, and after that difficulty had been overcome often fought each other for the possession of valuable pieces of territory. Such a war between the two most powerful states, Argentina and Chile, was concluded in 1902. Some guns used in the war were melted down and recast into a huge figure of Christ which has been erected on the summit of the Uspallata Pass, part of the agreed boundary between the two countries. The "Christ of the Andes" marks in a very striking way the reconciliation of the former enemies.

Civil wars and revolutions were also for a long time of frequent occurrence in the South American States, but they have now settled down to more peaceful ways and many of the Republics, as we shall see, have become very prosperous.

In Spain's quarrels with her European neighbours she not only lost most of her West Indian possessions but Guiana on the north coast of South America passed into the hands of the British, the Dutch and the French. But the Spanish language and the Roman Catholic religion introduced by the early conquerors have retained

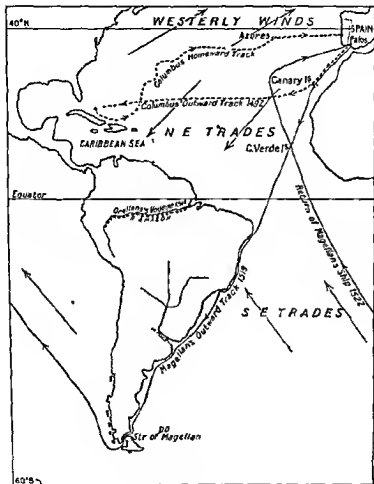


FIG 13—Some Famous Voyages

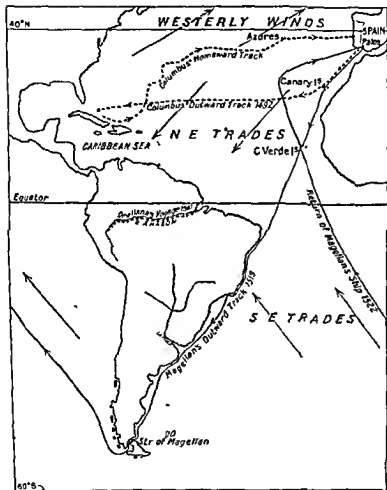


FIG 13—Some Famous Voyages

their influence in South America, although the rule of Spain has entirely disappeared

Brazil had a similar history to that of the Spanish colonies. The Portuguese, however, treated the natives more kindly and took rather more interest in their own colonists. For a time, in the early part of the nineteenth century, the King of Portugal, exiled from home, resided and ruled in Brazil. In 1889, however, the colonists declared their independence of Portugal and established the Federal Republic known as the United States of Brazil. The population is very mixed, containing not only the descendants of the Portuguese and the Indians, but also a large mixture of negroes introduced as slaves from West Africa to work in the tropical plantations of the coast-lands and Amazon Basin. Although, as we have seen in the previous chapter, the native races of Brazil were not highly civilized, and had not learned the use of metals, the Brazilian Highlands are rich in minerals of all kinds which are now being worked.

We will now proceed to a short study of the South American States as they are to day.

QUESTIONS AND EXERCISES

1 Notice on Fig. 13 the relative position of Spain and the West Indies. Why were the latter the first part of the New World to be discovered by the Spaniards?

2 Draw an outline map of South America and mark upon it the names of the principal explorers in the areas that they explored.

3 Compare the Spanish colonization of South America with the British colonization of Australia and New Zealand.

4 What European languages are spoken in South America? Where and why?

5 Balboa was the first Spaniard to see the Pacific Ocean. He saw it in 1513 from a hill on the Isthmus of Panama or Darien as it was then called and named it The South Sea. Why?

CHAPTER VI

BRAZIL

This important state, which covers half of South America, is larger than Australia and New Zealand together and has five times as many people. But although it is thus nearly as big as Europe it has not so many people as England. It may be conveniently divided into the Amazon Basin, the Brazilian Highlands and the coastal region.

THE AMAZON BASIN AND THE RUBBER INDUSTRY

We have learnt a good deal in previous chapters about the hot wet forests of the region, their productions and peoples. Although valuable timber trees can be obtained and easily floated down the river and its tributaries, the most valuable product of the forest is *india rubber*. The trees grow wild in the forest and are tapped by natives or half-breeds in the employ of Brazilian merchants. The collector builds himself a rude hut in a part of the forest where the trees abound and goes out each morning with a huge knife to clear his way among the undergrowth. He also takes a number of light tin cups. Having reached a tree he makes a sloping gash in its bark as high up as he can reach and attaches a cup at the lower end. A thick milky juice, or 'latex,' begins to ooze slowly into the cup. Meanwhile the collector is fixing cups to other trees in a similar way and he may visit a hundred in his morning's work, working round so as to return to his hut for food and rest at midday. In the cool of the evening he goes out with a large bowl, often made from a gourd or outer shell of the larger forest fruits. Into this he empties the latex.

cups and once more returns to his hut. He then lights a fire and burns upon it nuts collected in the forest to give a thick smoke. Dipping a paddle shaped piece of wood into the latex he takes it out and quickly twirls it in the smoke till the juice solidifies into a grey film. He then re-dips it and repeats the process many times until his paddle has upon it a huge lump of rubber, which is removed by cutting it through the middle with his knife.

This routine continues for many days, the trees being visited and new gashes being made lower down the trunk each day until the yield of juice begins to diminish. The collector then stows his lumps of rubber in his dug-out canoe and paddles down stream to the nearest village where a merchant will purchase it in exchange for food-stuffs, luxuries, ornaments and the useful knives imported from Britain or elsewhere. Small river steamers or motor-boats collect from the villages and take the rubber to one of the larger river ports.

Manaos is such a port in a great rubber growing district, and although nearly a thousand miles from the mouth of the river it is visited by ocean going steamers, and is a well laid out city with most up to date modern conveniences including electric light and newspapers. The Amazon and its great tributaries, especially the Negro, also bring down cargoes of Brazil nuts and fine timber for export.

Para, sometimes called *Belem*, is a much larger seaport near the mouth of the river and gives its name to the Brazilian type of rubber which forms its chief export. The port also serves the valley of the Tocantins. Its population of over a quarter of a million is very mixed, consisting of Brazilians, Indians, negroes and various mixtures of these peoples. Some of these work on cocoa plantations which have been laid out in forest clearings and provide another article for export.

It should be remembered that although the Amazon

forests send out the largest proportion of "wild" rubber, much vaster quantities of cultivated rubber are now produced in the plantations of the Malay States, the East Indies and Ceylon, where plants from the Amazon forest have been introduced and thrive in a very similar climate

THE BRAZILIAN HIGHLANDS

These open savana lands are the most healthy part of the country, but being rather difficult of approach owing to the steep escarpment facing the sea and the consequent falls on the rivers they await railways for their full development. But these are gradually being extended from the coast to the rich mining districts of the plateaus which produce gold and diamonds as well as more useful minerals. Cattle ranching is a thriving industry of the savanas where there are also forests producing valuable cabinet woods and plantations of tobacco and *yerba maté* (tea) and coffee. There are no large towns in this region but it is proposed to build a Federal Capital for the whole country near the source of the Tocantins River. The Sao Francisco River is an important highway of the plateau and a railway completes the route from its falls to the coast.

THE COASTAL REGION AND THE COFFEE INDUSTRY

The east coast is at present the most productive and thickly populated region of Brazil. The hot wet coastal plains of the north are rather unhealthy but have valuable plantations of sugar cane, cocoa, cotton, tobacco and pineapples, worked mainly by negroes of African descent. *Bahia*, with a fine harbour and a railway to the falls of the Sao Francisco River, is in the centre of the tobacco and cocoa planting region and is the third city of the country in size. *Pernambuco*, or Recife, is the outlet of valuable cotton plantations, and railways radiate from it inland and along the coast to north and south.

The hill slopes which form the escarpment of the plateau on both sides of Rio de Janeiro are famous for their *coffee* plantations, which are the chief source of wealth of Brazil and provide four fifths of all the world's coffee. The plants, which are like small shrubs, need a fairly hot climate with plenty of rain, a fertile soil and good drainage, such as is provided by the hill slopes of Brazil after they have been cleared of forest trees. The coffee plants are covered in spring (September) with white sweet scented blossoms which change to red berries about the size of a cherry two months later. They are then picked. The outer husks are removed by soaking in water and passing over a revolving cylinder with a roughened surface, and the coffee beans, of which each berry yields a couple, are then dried in the sun or, on the more modern plantations, by steam heating. The beans are then packed in sacks and sent down to the coast for export.

Sao Paulo, the second city of Brazil, is the chief centre of the coffee industry. Situated well above sea level it has a healthy situation, and being very wealthy is finely laid out. Railways connect it with its port, *Santos*, with the capital, Rio de Janeiro, and with many districts on the plateau (Fig 14).

In the extreme south of Brazil, on the open grasslands, are prosperous colonies of Italians, Germans and Russians mainly engaged in cattle ranching, providing hides and frozen meat for export from *Porto Alegre*. In this region also there are plantations of the *yerba mate*, or Paraguay tea, which provides the chief beverage of South America.

Rio de Janeiro, the present capital and largest seaport of Brazil, has a million and a quarter people. It is claimed by many to have the finest harbour in the world, and its situation among the trees on the lower slopes of the highlands encircling the blue waters and white beaches of the bay, is certainly very beautiful. It has flour mills, cotton mills and other factories, while railways follow

the fertile coastal plain and connect it with the mining districts of the highlands. It has liner services to Portugal, Britain and the United States of America. Its chief export is coffee, while it imports coal, textiles and machinery from the United Kingdom and the U.S.A., and wheat from Argentina.

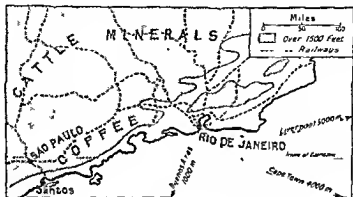


FIG. 14.—Where four fifths of the world's coffee is grown.

QUESTIONS AND EXERCISES

1. Use the following figures to construct a diagram showing the relative value of the exports of Brazil in 1921

Coffee, 35 Sugar, 3 Frozen meat, 2 Tobacco, 2 Cocoa, 2
Leather, 2 Cotton, 2 Yerba maté, 1 Rubber, 1
Total 50 Value in millions of pounds sterling

In what

does it

2. of the

of the

3. What factors have hindered railway development in Brazil?

4. What port in Australia is similarly situated to Rio de Janeiro?

Compare their exports.

5. Compare and contrast the Amazon with the Congo.

6. During what months can the sun be seen vertically overhead in Brazil?

7. What are the chief aids and hindrances to navigation on the Amazon?

8. Why is "plantation" rubber so rapidly superseding "wild" rubber?

CHAPTER VII

ARGENTINA

This is a country of over a million square miles and about nine million people, most of whom speak Spanish. The last fact, and also the similarity of its climate to that of southern Europe, have attracted many Italian and Spanish immigrants to work on the great *estancias* or farming estates of the country. The country may be divided into

1 The sub tropical and well wooded *Gran Chaco* region of the north

2 The warm temperate *Pampas*

3 The cool temperate semi desert of *Patagonia*

THE GRAN CHACO

This region, whose name means "the great hunting ground," has already been described and much of it is still undisturbed forest. But the *yerba mate* tree yields the "tea" so commonly used in South America, and from the great *quebracho* trees good tanning material is obtained. In the region near the Andes the greater rainfall and high temperatures allow of the cultivation of sugar canes, cotton and tobacco.

Tucuman is the largest city of this area, beautifully situated below the foothills of the Andes, which in many countries would be regarded as high mountains, and the streams from which provide water for irrigating the plantations in the dry season. Several railways converge upon it from the Pampas and one goes northward climbing the Andes to the Plateau of Bolivia, to bring down tin and silver from the mines.

THE PAMPAS REGION

The great natural grass lands of this region were described in a previous chapter. They are the most valuable part of the whole country and now form the cattle ranches and corn lands which make Argentina one of the greatest meat providers and granaries of the world. Fine cattle introduced from Europe thrive so well in these rich grasslands that they now number three times as many as the people. They are kept in large herds in fenced fields several square miles in area, tended by the famous horse riding gauchos who round them up from time to time for the slaughter yards, which deal with hundreds of animals daily. Some are exported as frozen beef, others as tinned meat, while the carcasses of some are boiled down to make the various meat extracts so largely advertised and consumed in Britain and other countries. Hides also form a valuable export from the cattle farms.

Cordoba, the third city of Argentina, is a great centre of this cattle ranching and meat packing industry on the drier western plains, and railways connect it with the outlying farms and with the seaports.

Further west and closer to the Andes the region becomes drier still, but where streams from the mountains provide water for irrigation Mediterranean fruits of all kinds come to perfection and good wine is made from the grapes grown. *Mendoza* is the chief centre of this district, at the point where the trans Andean Railway begins the ascent to the tunnel under the Uspallata Pass.

The eastern part of the region, with a more certain rainfall, has, however, become the richest part of the whole country, vast areas of the Pampas having been ploughed up in order to produce fine crops of wheat and maize for home use and export. All the operations of ploughing, sowing, reaping and thrashing are done by the most modern machinery, and on a very large scale.

indeed The flatness of the country has made railway construction easy and the rivers and seaports are open all the year round, so that the produce can be readily marketed, and the Argentine harvest comes in January when the granaries of the Old World are becoming exhausted So the country has been able to borrow capital from the older established countries, like Britain, in order to develop its railways, and has become very prosperous indeed

Rosario, to which large ocean going vessels ascend the Parana is a great corn port and the second city of Argentina

PATAGONIA

The better parts of this region provide pasture good enough for sheep, and large flocks are kept to produce frozen mutton and wool for export There are a number of small shipping centres on the coast, but *Bahia Blanca* is the only one of considerable size.

BUENOS AIRES AND THE ARGENTINE RAILWAYS

Buenos Aires is not only the capital of Argentina, but with a population rapidly approaching 2 millions it is the largest city in South America The value of the Pampas land having gone up by leaps and bounds owing to its rapid and peaceful development in the last fifty years many of the landowners have become enormously rich, so that the city has become as luxurious as any capital city of the Old World The name, which means "good air," speaks of its healthy situation, and although sandbanks prevent the wide estuary of the La Plata from making a good natural harbour a fine artificial one has been constructed to deal with its enormous trade It exports vast quantities of beef and mutton, wheat and maize, receiving in return textiles, metal goods and coal

Notice the great network of railways that radiate from

Buenos Aires in all directions over the Pampas (Fig 15). Most of these have been constructed by British capital, with rails and rolling stock purchased in Britain, and many are controlled by managers who have been trained on British railways. About two thirds of the 22,000 miles of railway are on the wide 5 feet 5 inch gauge, the rest being of narrow 3 feet 3 inch. The most interesting of the lines is that which crosses the Pampas to Mendoza,

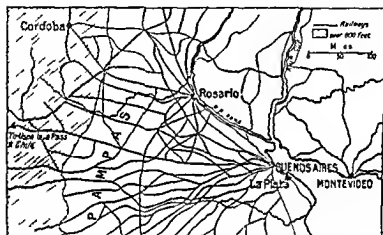


FIG 15 —Buenos Aires and some of the Argentine Railways

winds up the valley of the river to a height of two miles above sea level among the towering snow capped peaks of the Andes, plunges through the long tunnel under the Uspallata Pass, toward still steeper gradients and too frequent snow, and finally emerges on the steep Pacific slope to zigzag down to the fertile valley of Central Chile, which is reached in a day and a half. This railway is now supplemented by an air mail route as far as Mendoza, while other air routes radiate from the capital to Corrientes at the junction of the Paraná and Paraguay Rivers, and to the other cities already mentioned in this chapter.

QUESTIONS AND EXERCISES

1 Draw diagrams comparing the area and population of Brazil and Argentina

Brazil 3.3 million sq miles 31 million people

Argentina 1.2 million sq miles 9 million people

Take 1 sq inch to represent a million sq miles and represent each million people by one dot. Draw a similar diagram for the British Isles and explain the differences that the diagrams show.

2 Why is the La Plata River system more useful commercially than the Amazon?

3 Measure on your map the distance between Buenos Aires and Valparaíso. Compare the average rate for the railway journey between these two cities with long distance express rates in Britain, and explain the difference.

4 Compare and contrast the situation and trade of Buenos Aires with those of Port Elizabeth and Sydney respectively.

5 Why is Buenos Aires a greater city than Rio de Janeiro?

6 What South American countries are connected by rail with Argentina?

7 In what respects does the commerce of Argentina resemble that of Australia? What differences are there?

8 The average size of an Argentine *estancia* is 400 square miles. Compare with the size of your own county.

9 Why do not many British emigrants go to Argentina?

CHAPTER VIII

CHILE

This country occupies more than half the Pacific coast of South America and although nowhere much more than 100 miles wide, is nearly 3 000 miles long. About half the country is more than 1 mile above sea level and the high Andes form a well marked eastern frontier. Although two and a half times the size of the British Isles it has not so many inhabitants as Scotland. There are three fairly distinct natural regions in Chile viz, (1) the northern desert, (2) the fertile centre and (3) the forested south.

THE ATACAMA DESERT

This is roughly bisected by the Tropic of Capricorn, and its lack of rainfall is due to the fact that for half the year it lies within the tropical Belt of Calms while for the rest of the year the South east Trades blow off shore, having deposited their moisture on the eastern side of the Andes. It is bare not only of trees but of grass and dunes of loose sand made progress across even the level parts almost impossible until the discovery of its valuable nitrate deposits made it worth while to construct railways to the diggings. The nitrates which make valuable fertilizers have been preserved owing to the lack of rainfall and therefore of vegetation which would have used them up. They usually occur in thick layers a few feet below the desert sands, and are located by boring after which they are excavated by digging or by blasting with explosives. Narrow gauge railways carry the nitrates down to the ports which are often just a few jetties alongside which lie the barges that trans-

port the mineral to ships standing off shore. In the larger ports such as *Iquique* and *Antofagasta* there are refineries where the material is reduced in bulk or treated to extract useful chemicals for export. Drinking water for those engaged in the nitrate industries is brought from reservoirs in the Andes fifty to a hundred miles away, and all foodstuffs have to be brought by rail or sea from other ports of Chile or foreign countries. As nitrates form, however, the most valuable export of the country, this is worth while. The railways from Antofagasta and *Arica* go beyond the nitrate districts into the high Andes of Chile and Bolivia, bringing down copper and silver from the mines for export. Another manure exported from this region is *guano*, collected from islands off the coast, which are the resting places of swarms of sea birds.

CENTRAL CHILE

beauty of its surroundings Unfortunately it suffers from earthquakes which have frequently destroyed many of its buildings and inhabitants Its harbour is well protected from the westerly winds of winter, and it exports minerals, especially copper, wines for which Chile is famous, and also fresh fruit and any surplus corn that the country produces Like other Chilean ports it has benefited by the opening of the Panama Canal, which has brought it nearer to the thickly populated parts of the United States of America and Western Europe



FIG. 16.—Central Chile and the Uspallata Pass

SOUTHERN CHILE

The physical features, climate, natural vegetation and native peoples of this region have already been described and it has been seen that none of these factors favour its development at present In the island of Tierra del Fuego and the part of Patagonia belonging to Chile there are some sheep ranches and wool is exported from *Punta Arenas* (Sandy Point) on the Strait of Magellan Before the opening of the Panama Canal when all ships trading between the Pacific coast of America and Atlantic ports had to pass through the Strait, this port had also some importance as a coaling and repair station, but *this has declined*

QUESTIONS AND EXERCISES

1 Chile's best customers are the United States of America and the United Kingdom, and from them she also receives the bulk of her imports. What is the nature of the trade between Chile and these countries respectively? How does Chilean produce reach Britain?

2 Draw two diagrams showing the winds and calms that influence the climate of Chile in winter and summer respectively.

3 Describe the changes in scenery that one might observe in a voyage along the Chilean coast.

CHAPTER IX

PARAGUAY, URUGUAY AND THE FALKLAND ISLES

PARAGUAY

This is a small state with about a million inhabitants, chiefly Indians and half breeds, and as the country has suffered from continual wars and revolutions down till recent years it is not very prosperous. That part of the country adjoining the Pampas partakes of their character, and there are considerable cattle farms producing hides and meat extracts for export. The moister parts of the country between the Paraguay and Pilcomayo Rivers contain part of the forested Chaco which produces the famous *yerba maté* or Paraguay tea, and there are also plantations of oranges, tobacco and sugar cane. A tanning material obtained from the quebracho tree is also exported. Most of the trade is carried on through Argentina by means of river steamers on the Parana River, but there is also a through railway route from the capital, *Asuncion*, to Buenos Aires, crossing the Parana by a train ferry. The capital, with about 100,000 people, is the only town of any size.

URUGUAY

This country, lying between the cattle ranching areas of Brazil and Argentina, is itself little else than a great ranch, 60 per cent of the country being devoted to stock raising, and 95 per cent of its exports being animal produce. Considerable areas are, however, now under the plough and produce good crops of wheat, maize, vines and tobacco.

Montevideo, the capital, contains about a quarter of

the one and a half million people of the Republic. It is a finely built city on a beautiful bay extending inland from the La Plata estuary. The hill from which the city takes its name is only about 500 feet high but, rising from a flat region, is very conspicuous. Near the city are great slaughterhouses and canning factories preparing frozen meat, meat extracts, hides and wool for export. The harbour, although sheltered, is rather shallow and needs improvement. Railways radiate from the city northward into Brazil and north westward to the world famous meat packing centres of *Tray Bentos* and *Paysandu* on the Uruguay River. As in Argentina the railways have been built mainly with British capital and Britain is second only to the United States of America as a purchaser of Uruguayan produce.

THE FALKLAND ISLES

This group of about a hundred islands, of which only two are inhabited, lies about as far south of the Equator as Britain is to the north, and forms a British Crown Colony. Being very hilly and always in the track of the stormy westerlies they receive enough rain and more than enough wind, so that only grass and stunted bushes will grow. As they are similar to the Hebrides in their situation and climate, life in the two island groups is very similar. The people are hardy and live by growing oats and rearing sheep, which supply them with food and with wool for export. Some work in the harbour repairing and refitting ships, especially sailing ships which have suffered in rounding Cape Horn, and others go to the whale fisheries of the Antarctic, which provide whale-bone and whale oil for export. The capital is *Port Stanley* whose thousand inhabitants are a third of the total population of the islands. Communication with the mother country is kept up by wireless telegraphy and a monthly mail boat.

QUESTIONS AND EXERCISES

- 1 What are the relative advantages of Uruguay and Paraguay ?
- 2 In 1921 the exports of Paraguay were worth £2 mill while those of Uruguay were worth £15 mill Can you account for the great difference ?
- 3 Why do you think Buenos Aires has become a greater city than Montevideo ?
- 4 Why does the La Plata estuary tend to become silted up ?
- 5 What is the time in the Falkland Isles when it is noon in England ? Which is the longest day of the year there ?

CHAPTER X

BOLIVIA AND PERU

BOLIVIA

This country, about four times the size of the British Isles, has no coastline, and the most thickly peopled part of it lies more than two miles above sea level. Thus, although it is well within the tropics, temperatures are not very high, and nights are almost always cold or even frosty. But owing to the rarity of the atmosphere at these heights the sun shines through with great intensity during the day. The portion of the country east of the Andes receives abundant rainfall and is well forested, but the sheltered plateau between the higher ridges of the Andes has scanty rainfall. This can however be supplemented by water from the many rivers which flow from the Andean glaciers to Lake Titicaca and other lakes in this great basin of inland drainage.

About half of the 3 million inhabitants are of pure Indian descent and a further quarter are of mixed descent. The forest Indians collect rubber for export down the Madeira, the great right bank tributary of the Amazon, which rises in Bolivia. Others work on the irrigated farms of the plateau growing wheat and potatoes and other crops of temperate lands for home consumption, or keep flocks of llamas which provide flesh, wool and means of transport. Minerals form Bolivia's chief sources of wealth. Silver had been worked for centuries before the coming of the Spaniards and is not yet exhausted, but the more recently opened tin mines are now more valuable. Bolivia produces about a quarter of the

world's tin and is second only to the Malay States as a producer of this metal

La Paz, a city of about a hundred thousand people, is the actual, although not the nominal, capital of the country. Although it is over two miles above sea level it lies at the bottom and up the sides of a deep gorge in the plateau excavated by a torrential stream. The Spaniards constructed its huge cathedral by slave labour and ornamented it with treasures stolen from the Incas. Trams in its steep winding streets give a modern touch to the city, and from its outskirts on the plateau railways run into the neighbouring countries of Peru, Chile and Argentina, taking down the minerals for export.

The other centres of population are only farming or mining villages, neither the capital, *Sucre*, nor the famous silver mining centre of *Potosi* having thirty thousand people (Fig. 17).

PERU

The country of some 5 million people can be conveniently divided for study into three regions, viz. (1) the Pacific Coastal region, (2) the high ridges and valleys of the Andes, (3) the Forests of the Upper Amazon.

The Coastal Region

This is a desert or semi desert region like the adjoining parts of Chile. Some of the valleys of the streams which cross it are however quite fertile strips and support a considerable number of people growing sugar canes and cotton, as well as wheat and grapes under irrigation. The region is subject to earthquakes.

Lima, the capital, built by Pizarro, lies in such a valley. It has a considerable cathedral, but most of its buildings are of sun dried mud colour washed, to make a bright appearance in the sunshine. It lies some eight miles from *Callao*, its seaport which is the second city in size, but lies in an unhealthy situation.

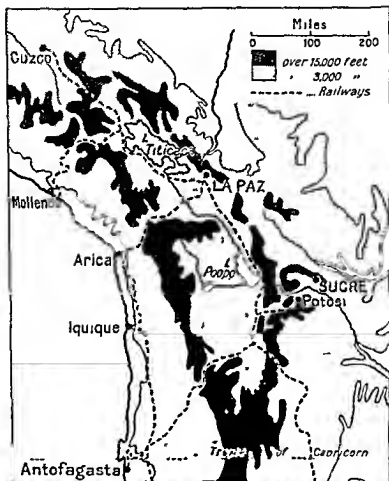


FIG. 17.—The Land of the Incas, and the modern mining districts of Peru, Bolivia and Chile

The Andean Region

As in Chile this has still valuable minerals, chiefly copper now, as the precious metals have been almost worked out. The high valleys produce under irrigation the crops of temperate lands, and the hill slopes feed flocks of llamas, alpaca and vicuna, supplying bales of wool for export. The plateau is reached by rail from Lima, and further south from *Mollendo*, the latter railway climbing to a height of three miles above sea level to cross the main cordillera of the Andes before descending to the plateau.

Cuzco, now only a very small town, is interesting as the old capital of the Incas, and its fine stone walls, bridges, irrigation works and temple ruins remain to remind the visitor of their civilization. Their great imperial road southward along the plateau is now followed by a rail route to La Paz in Bolivia, and further south into Argentina.

The Eastern Forests

thinly in the higher *Montana* regions, but becoming dense jungles in the *selvas* of the lower parts of the area. These forests produce valuable medicinal drugs, the best known of which is quinine. This is extracted from the bark of the cinchona tree, and the natives had discovered its value in cases of malaria and other fevers before the coming of the white man. Although the cinchona tree has now been planted in many other countries with similar climate its bark is still known to commerce as "Peruvian bark." Cocoa trees are cultivated in the forest clearings and the natives collect rubber as in the Brazilian parts of the forest.

Iquitos, on the Amazon, is the collecting centre for all

these products, which are taken down stream in river steamers or motor boats. Difficulties of communication with other parts of the country have been overcome by the construction of a wireless station at Iquitos and other places.

QUESTIONS AND EXERCISES

1 Draw from the physical map in your atlas a section across Peru and Bolivia and indicate upon it the three natural regions and their distinctive climatic features.

2 Describe the difficulties of railway construction in Peru.

3 What changes of scenery would be observed in crossing Peru from Iquitos to Callao? What methods of transport might be used in such a journey?

4 sugar, cotton and copper,
to the United States of America
the areas of production of
it is exported.

5 Try to obtain and read Prescott's *Conquest of Peru*.

CHAPTER XI

THE NORTHERN STATES OF SOUTH AMERICA

ECUADOR

This small country, which takes its name from its situation on the Equator, has no definite boundaries except the coast, and has rather less than 2 million people, most of whom are pure Indians. The coast lands on the west, like the Amazon forest lands on the east, are thickly forested producing the usual timbers and rubber, but the cocoa plantations of the coastal districts are the most valuable asset of the country, providing four fifths of the total exports. *Guayaquil*, the largest town and chief seaport of the country situated at the head of the *Gurayas* estuary, which forms a good harbour, is the centre of the cocoa industry. Panama hats made from the stems of a locally grown plant are also a valuable export.

The scenery of the interior is very grand, including *Cotopaxi* and *Chimborazo*, two snow capped volcanic cones towering above the Andean Cordilleras. Glaciers provide streams for irrigating the plateau regions which are rather dry and, owing to their elevation, have a climate like an English springtime, although they are on the Equator.

Quito, the capital, with 80,000 people, is the largest town of the plateau region. A railway connects it with *Guayaquil* the journey of 218 miles taking two days! The city has often suffered from earthquakes and volcanic eruptions, and is not very well developed.

COLOMBIA

This country, about four times the size of the British Isles, and having about 6 million people, may be conveniently divided into three regions for study (1) The eastern plains, (2) the Caribbean coastlands, (3) the parallel ridges and valleys of the northern Andes (see Fig 2, p 11)

The eastern plains consist of the grassy *llanos* of the Orinoco River, which are well suited for pasturing horses and cattle, and, further south, of the *seltas* of the Amazon, producing rubber, etc. These parts of the country are thinly peopled and not well developed.

The northern coastlands are hot, wet and unhealthy, but have valuable plantations of sugar cane, cocoa and bananas, while the hill slopes produce coffee, the principal export of the country. *Cartagena*, famous for the fight between Spaniards and British seamen in the sixteenth century, and *Barranquilla*, the outlets of the Magdalena valley, are the chief seaports of the country.

The Andean Region is the most thickly peopled, the greater elevation making the climate more healthy. The lower parts of the Magdalena and Cauca valleys have plantations and cattle pastures, while the mountains above them are still rich in minerals, including gold, emeralds, mercury and platinum.

Bogotá, healthily situated on the plateau, is the capital, with 160,000 people. A railway connects it to Honda, at the rapids of the Magdalena river, below which there is uninterrupted navigation for river steamers for about 600 miles down to the sea. This is the chief commercial highway of the country. In the neighbourhood of Bogotá are valuable salt mines and iron mines, and also factories manufacturing "Panama" hats.

Medellín, a gold mining centre on the plateau, is the second city in size.

VENEZUELA

The name of this country means "Little Venice," and originated from the description given by the Spaniards to a settlement of native Indians whose huts were built on piles in the lagoon of Maracaibo, in much the same way that the famous Italian city is built on piles in a lagoon at the head of the Adriatic Sea. The country is about three times the size of the British Isles and has some two and a half million people including many Indian tribes in the interior.

The north western portion of the country is the best developed, having plantations of coffee, cocoa, sugar and cotton. These products are exported from *La Guayra*, the seaport of the capital *Caracas*. The latter is healthily situated 3,000 feet above the sea and although on the map it appears to be only half a dozen miles from the seaport, the zigzag midway route, cut into the face of the mountains, makes the journey between them more than twenty miles. The capital is well laid out and has a University, Opera House, electric trams, telephones and factories for manufacturing coarse cotton goods, matches, glass and cement. Another railway connects *Caracas* with *Valencia*, a rich plantation centre, and *Porto Cabello* its seaport.

The llanos of the Orinoco have already been described. The natives and half breed llaneros rear large herds of cattle and horses on these grassy plains, and hides form the third largest export of the country. The market centre of this region is *Bolivar*, named after the liberator of several of the South American Republics from the rule of Spain. Sea going vessels navigate the Orinoco to *Bolivar*, above which small vessels and canoes can penetrate many tributaries. The that fringe the the highlands that rise steeply to the south and east of

the great river This was the region of El Dorado whose fabulous wealth lured the great Elizabethan adventurers

BRITISH GUIANA

This consists of a broad coastal plain crossed by a number of long navigable rivers running northward from the plateau region in the south of the country It is about as large as Great Britain, but has less than 300,000 people, most of whom are coloured folk, large numbers having been brought from East India and Africa to work in the plantations

The swampy coastal strip is curiously the best developed part of the country, having valuable sugar plantations, which produce the famous Demerara sugar, and rice fields which supply foodstuff for the workers and a surplus for export Both these crops thrive in the hot wet climate of the country, which is, however, rather unhealthy, especially for white men Malaria and other fevers are spread by mosquitoes and flies which infest all stagnant pools The Dutch who held this region before the British had constructed many drainage canals, some of which can be used for navigation The canals and rivers are bordered by gorgeous tropical plants and support wonderful water lilies, including the famous Victoria regia

Further inland is a dense forest belt supplying fine hard timber, including the famous greenheart, and also balata gum, a sort of indiarubber Beyond the forest belt the land rises to grassy savanas, which support considerable herds of cattle In the highlands are valuable gold mines, and diamonds are also found Other valuable minerals are known to exist and may eventually be worked by the enormous water power available where the rivers fed by the heavy rains brought by the Trade Winds tumble down the steep slopes of the plateau The famous Kaietuk Fall (see p 13) is on the Potaro, a

tributary of the Essequibo, which is the longest river of the colony

Georgetown, at the mouth of the Demerara River, and connected by rail with the Essequibo, is the capital and chief seaport of the country. A railway also traverses the fertile coastal strip to *New Amsterdam*, whose name again reminds us of the Dutch. Georgetown exports sugar, mainly to Canada, gold, diamonds, hard woods, and balata to Great Britain, and rice to the West Indies.

To the East of British Guiana lie *Dutch Guiana* and *French Guiana*, two regions with similar productions, but not so well peopled nor so well developed. All these countries need better roads and railways and a larger supply of labour for the full development of their plantations, forests, savanas and mines.

QUESTIONS AND EXERCISES

1 Why are the capitals of the northern Republics of South America so high above sea level? What are the advantages and disadvantages of such a position?

2 Can you suggest any reasons why the capitals of the Guianas are on the unhealthy coastal plain?

3 Read Kingsley's *Westward Ho!* for descriptions of these parts of South America.

4 With what product is the capital of French Guiana commonly associated?

5 Draw a diagram to illustrate the four natural regions of British Guiana and their important products.

6 Why are African negroes found in the Guianas and Brazil and not in the other South American States?

7 Compare the Guianas with the Guinea Lands of Africa in physical features, climate, productions and people.

CHAPTER XII

NORTH AMERICA PHYSICAL FEATURES

The map shows several similarities between North America and South America. Both are wider in the north and taper towards the south, while in both a high mountain system runs from north to south on the western side and is separated from a lower highland system to the east by great central plains.

THE WESTERN MOUNTAINS

These, like the Andes, consist of a number of vast folds on the earth's crust, and have been formed in a similar way. The most easterly chain overlooking the great plains forms an almost continuous wall from the Arctic Ocean to the Gulf of Mexico, and in Canada and the United States is known as *The Rocky Mountains*. It contains many peaks almost three miles in height, rising abruptly from the plains, their rugged snow-capped summits making a fine contrast with the dark pine forests of their lower slopes. The lowest passes across the range, such as the Crow's Nest and the Kicking Horse in Canada, which are traversed by the Canadian Pacific Railway, are almost a mile above sea level, while the railways of the United States have to climb still higher to negotiate the Rocky Mountains. The melting glaciers of the higher valleys send down water to many tributaries of the great rivers of the plains.

West of the Rockies in Canada come a number of almost parallel ridges and valleys, among which may be noted the Selkirk, Gold, Cascade and Coast Ranges, and the valleys of the Yukon, the Fraser and Columbia Rivers. Few parts of the world can rival this region for the magnificence of its scenery. The chain of islands off the coast

of British Columbia represents the most westerly chain of the system, which has at some time sunk sufficiently to let the sea through the river gaps into the valleys behind. Many of these valleys were once filled with glaciers which have since melted, and their long, narrow, winding, steep sided valleys now form picturesque fiords, which make excellent harbours behind the shelter of the island fringe.

Behind the Rocky Mountains further south lies a great uplifted plateau, somewhat similar to the plateau of Bolivia, but larger. Many of the rivers that drain the slopes in this region never reach the sea, but flow to the Great Salt Lake, in the centre of the *Great Basin*, as it is called. The southern part of the plateau in the State of Colorado is famous for the stupendous gorge excavated in it by the Colorado River. This river bringing water from the western slopes of the Rockies, has for 200 miles eaten its winding course, in places more than a mile deep, through the horizontal layers of the plateau. As the plateau receives little rain itself, the sides have not been washed down and have remained almost perpendicular, while the vivid colours of many of the rock layers add to the extraordinary appearance of the *Grand Canyon*, as the gorge is called. Other rivers of this region have done similar work on a smaller scale, and the plateau is cut up into a number of flat topped mountains called *mesas*, or, where small, *buttes* (Fig 39, p 147). Owing to the drought there is little or no vegetation, and the scenery of the region is very weird.

The Great Basin and Colorado Plateau rise in the west to the steep face of the *Sierra Nevada* a snowy range, which may be regarded as a continuation of the Cascade Range of Canada. This range contains several extinct volcanoes, such as Mount Shasta and the rivers rushing down its western slopes into the Great Californian Valley beyond have excavated very picturesque gorges in the forested mountain sides.

Between the Sierra Nevada and the Coast Ranges of the United States lies the great Californian Valley, one of the most fruitful regions in the world, and the two rivers which drain it enter the sea through the Golden Gate, which gives access to the harbour of San Francisco, the largest seaport on the Pacific Coast of America.

The Coast Range continues southward through the Californian Peninsula, the long parallel valley between it and the Plateau of Mexico having been "drowned" by the sea forming the Gulf of California, which receives the water of the famous Colorado River.

We shall learn more in later chapters of the great mineral wealth, the wonderful scenery, the fruitful valleys, and the magnificent forests of this region of the Western Cordilleras.

THE EASTERN HIGHLANDS

These are the oldest part of the continent, and although they too probably once consisted of folded ridge and valley, like the western highlands, their character has been changed by untold centuries of wear and tear by heat and cold, rain and rivers, frost and moving ice. These forces of denudation wore down the ridges and filled up the valleys, reducing the whole system to a sort of low plateau or, as some call it, a *peneplain* (= almost a plain). A later uplift of the whole region to a higher level strengthened the action of running water which began to eat away the softer rock layers, leaving the harder ones outstanding as ridges (Fig. 18) running roughly from south west to north east, with parallel river valleys in between. It needs a large scale map of the region to show these features, but their trend can be observed in the peninsulas and gulfs of Nova Scotia and Newfoundland, where a later sinking of the region has let the sea into the northern ends of some of the valleys.

The River St. Lawrence, draining the Great Lakes of which we shall learn later, cuts across the Eastern High-

lands To the north lie the *Labrador Plateau* and the *Laurentian Highlands* These consist of old hard rocks, scraped almost bare of soil by the action of ice in the Great Ice Age, but containing valuable minerals, and being partly covered by useful forests The plateau is studded with small lakes supplying tributaries of the St Lawrence, which provide abundant water power where they drop from the edge of the highlands to the river valley

South of the St Lawrence lie the parallel ridges and valleys of the *Appalachians*, of which we have already learnt These too are well forested, and the rivers leaving



FIG 18.—Diagrammatic Section across the Eastern Highlands of the U.S.A. There are many more folds and rock layers than those shown in the diagram

them for the coastal plain do so by falls and rapids which supply power to the factories of many towns situated on the *Fall Line* as it is called (Figs 18 and 39) The Hudson River and its tributary the Mohawk have cut a most valuable gap through these highlands to the Great Lakes beyond, a route followed by roads canals and railways, which have helped to make New York, at the mouth of the Hudson, the largest city in America (Fig 16) Other routes from east to west across the Appalachians are few and difficult On the *Allegheny Plateau*, which slopes inland from the Appalachians towards the central plains, lies the most valuable coalfield in America

The northern portion of the Appalachians seems to have sunk, allowing the lower courses of the rivers that

leave them to be invaded by the sea, making good deep-water harbours as those of New York, Delaware and Chesapeake Bays. The southern portion appears to have risen exposing part of the sea bed as a broad coastal plain, across which the rivers flow in slow winding courses.

THE CENTRAL PLAINS

These are the uplifted floor of an ancient sea, which once flowed between the highlands on either side. They consist of younger rocks similar to the limestone, sandstones, clays and gravels which cover most of the English plain. The rock layers remain almost in the horizontal position in which they were deposited, but there is a slight rise from east to west, as can be plainly seen by the direction of the rivers which flow into the plains from the Rocky Mountains. It should also be noted that although the rise is so gradual that at any point the country seems to be one vast level plain, the western portion of the plains at the foot of the Rockies, which rise steeply from it, is no less than 3,000 feet above sea level. This region is sometimes called the High Plains to distinguish it from the lower Prairies to the east.

Since the original uplift of these plains the northern portion appears to have sunk, submerging that part which now appears on the map as the broad and shallow Hudson Bay. Thus most of the rivers of the Canadian plains flow northward towards the Arctic Ocean and Hudson Bay, while the rivers of the United States flow southward to the Gulf of Mexico, but the "watershed" or "divide" between their upper courses is not at all well marked.

The Great Ice Age and its Effects

The map shows a great line of large lakes crossing the northern plains from the mouth of the Mackenzie to the mouth of the St. Lawrence, and a larger scale map shows thousands of others in this region. South of this line of

lakes and extending as far southward as the course of the great Missouri River the plains are crossed in many places by lines of low hills composed of mixed rock

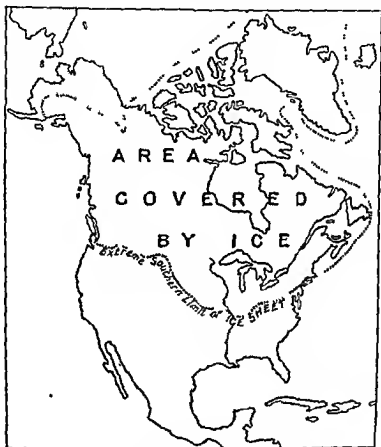


FIG 10—North America in the Great Ice Age

materials quite different from those of the surrounding plains. Both the lakes and the lines of low hills are now believed to be two results of the work of a great Ice Sheet which covered this part of Northern America in prehistoric

times (Fig 19) Such Ice Sheets can still be seen covering Greenland, the huge island that lies off the American coast, and in the vast Antarctic continent that lies around the South Pole The work of modern scientific observers in these regions has enabled us to understand what probably happened in North America and also in Northern Europe, including Britain, during the period known as the Great Ice Age

The climate of this region was much colder then than now, and snow fell and accumulated in vast quantities just as it still does in polar regions The snow filled the valleys and covered hills and mountains, only those peaks which exceeded a mile in height probably standing out above the enormously thick white layer, the lower parts of which became converted into solid ice under the great pressure of the snow above It has been observed that such Ice Sheets tend to move slowly outwards, especially of course where assisted by the slope of the land beneath them In moving they grind up and carry along the rocks beneath them, while boulders broken from outstanding peaks by the action of frost are often carried along on the surface of the ice When the edge of the Ice Sheet reaches warmer latitudes it melts, giving rise to rivers, or if it reaches the sea great lumps are broken from it and float away in the form of icebergs

Where the edge of the Ice Sheet melts the rock material which has been pushed along in front of and beneath it, or carried on top of it, is deposited, and in time would accumulate in sufficient quantity to form a line of hills which would mark the position of the edge of the Ice Sheet even after it had disappeared The existence of just such lines of *morainic hills*, as they are called, shows that the southern edge of the Ice Sheet in North America was at different times in different parts of the plains, probably due to the fact that the ice part advanced or retreated as the climate became colder or warmer

The lakes have originated in one of two ways They

either fill hollows in the harder rocks from which the softer parts have been scraped by the ice, or they fill valleys, which have been dammed up by a *moraine* of rock *débris* left by the ice (Fig. 20). Where the overflow of such lakes breaks through the barrier a waterfall results, and all the rivers flowing from the lakes towards Hudson Bay are impeded by falls or rapids formed in this way. Although these falls form a hindrance to navigation they may in future be of great value for development of electrical power.

After the Ice Sheet had retreated from the line of the Lakes, but still blocked their outlet to Hudson Bay, many

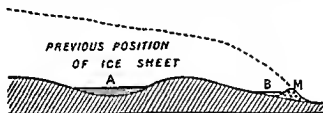


FIG. 20. The origin of lakes due to deglaciation. A. Valley—a hollow.

of them appear to have spread over much wider areas than at present. For example, Lake Winnipeg apparently covered what is now the basin of the Red River to the south, and the great fertility of that river basin is probably due to the fine soil deposited upon it when it was the floor of the larger lake.

The five Great Lakes of south-east Canada, the largest body of fresh water in the world, were at one period of the Ice Age unable to overflow down the St. Lawrence River as they do now, for it was covered by the Ice Sheet. Their outlet then was probably through the Hudson-Mohawk gap across the Appalachians, of which we have already learnt; and which probably owes its usefulness as a broad low route to day to the vast

quantities of water which flowed through it then (Fig 21)

The fiords on the east and west coasts of Canada are due to the submergence of valleys which were filled with glaciers during the Ice Age, while the work of ice in robbing north eastern Canada of its soil has been referred to already. The ice caps and glaciers of the higher parts of the Rockies and the ice covered plateau of Greenland are the sole remnants of the ice sheet which covered half the continent in the Great Ice Age.

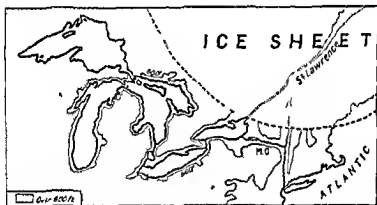


FIG 21—Approximate position of the Great Ice Sheet when the Great Lakes found an outlet for their water through the Mohawk Gap (MG)

THE GREAT LAKES

These are one of the most prominent physical features of North America. We have learnt of the way in which their basins were scooped out in the old hard rocks by the movements of the great Ice Sheet. Notice that some of them are drained to the Arctic Ocean by the great Mackenzie River and that Lake Winnipeg sends its waters down to Hudson Bay by the Nelson River. But the greatest group are the five that feed the St. Lawrence and link up the Central Plains with the Atlantic Ocean.

Lake Superior, the largest, is slightly larger than Scotland. Its surface is 600 feet above sea level and its depth exceeds 1,000 feet. Lakes Michigan and Huron are 20 feet lower and separated from Superior by the rapids of Sault Ste Marie (St Mary's Falls), which

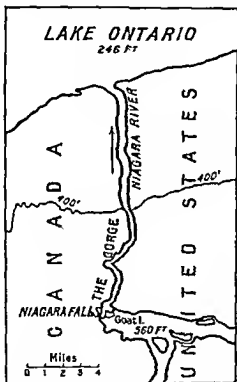


FIG. 22.—The Falls and Gorge on the Niagara River

have necessitated the building of canals for navigation. There is little further fall to Lake Erie, but the waters which leave it have to descend more than 300 feet before reaching Lake Ontario by the Niagara River. In the middle of its course this river, nearly a mile wide, goes

over a precipice of 160 feet, forming the world famous *Niagara Falls*, which are as useful as they are beautiful, for they supply electricity for lighting, heating and driving machinery in many towns of Canada and the United States. The Falls are divided by Goat Island, in the middle of the river, the wider Canadian portion being known as the Horseshoe Fall, and that on the United States side of the river as the American Fall. Below the Falls the Niagara River swirls along through the seven mile gorge which it has excavated in its lime stone bed (Fig 22)

The Falls are gradually receding upstream owing to

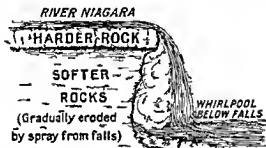


FIG 23 —Explains why the Niagara Falls have gradually receded upstream leaving a gorge below the falls. Compare with Fig 20

the wearing away of the shales and other softer rocks that underlie the limestone by the back splash of the water, as shown in Fig 23. To avoid the Falls and rapids of the Niagara River the Welland Canal has been constructed on the Canadian side, while the Erie Canal in the United States follows the Mohawk Valley (Fig 21). The outlet of Lake Ontario to the St. Lawrence is obstructed by rapids, among which the best known are the Lachine Rapids, near Montreal, which supply electric power, but have necessitated the building of the St. Lawrence Canals for navigation.

THE PLAINS OF THE MISSISSIPPI

The southern portions of the Central Plains slope southwards to the Gulf of Mexico and have not been under the influence of the great Ice Sheet. They are drained by the Mississippi and its many great tributaries which form a river system as great as that of the Amazon. These rivers have been at work for so long and have worn down their valleys so low that they meander very slowly through them in long winding courses (Fig. 24) and are navigable for vast distances. For example the Mississippi itself falls less than a thousand feet in the thousand miles between St. Paul and New Orleans, and the river route between these two cities is more than twice that distance. The great Missouri tributary, which is much longer than the main stream above the confluence of the two rivers, is navigable for small boats to Grand Falls where it leaves the Rockies a journey of over four thousand miles up the river from the Gulf of Mexico.

The plains of the lower Mississippi are covered with fine fertile alluvial soil brought down by the river and its tributaries in past ages and spread over the land in times of flood. These floods are still a source of danger

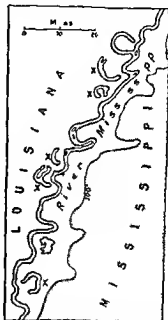


FIG. 24—Part of the Flood Plain of the Lower Mississippi. Notice the Oxbow Lakes (x) once part of the river which frequently changes its meandering course.

and hundreds of miles of embankments, called *levees*, have been built alongside the rivers to protect the valuable farm land from inundation. The map shows the great Delta which has been built up at the mouth of the river by the loads of silt brought down. This work is still going on and dredgers are always at work clearing the channel through the delta leading up to the great seaport of New Orleans.

We shall see later that the great value of these plains lies in the vast crops of corn and cotton, and great herds of cattle that they support, but under the surface layers of the plains in many places are buried valuable seams of coal, which have led to the growth of large manufacturing cities.

QUESTIONS AND EXERCISES

1 From your atlas map construct a section across North America along latitude 40° N and indicate the chief physical features shown by the section.

2 Draw a similar section along the meridian of 90° W.

3 Compare the western mountains of North America with those of South America.

4 In what other parts of the world besides British Columbia are there fjord coasts?

5 Compare the Appalachian Highlands with the Great Dividing Range of Australia in their physical features and effect upon the development of their respective countries.

6 Contrast the eastern highlands of North America with those of South America.

7 Compare and contrast the great rivers of North America with those of South America.

8 Why are there no great lakes in South America?

9 What advantages and disadvantages of North America to day can be traced to the effects of the Great Ice Age?

10 Compare the Niagara Falls with the Victoria Falls.

11 Where has it been necessary to construct canals for the navigation of the Great Lakes?

12 Compare and contrast the Mississippi with the Nile.

13 If CC represent coal measures in Fig. 18 would coal mining be easier on the plateau or in the Appalachians? Why? Why does the cost of coal production vary in different regions?

CHAPTER XIII

THE CLIMATE OF NORTH AMERICA

The climate of the greater part of North America is entirely different from that of most of South America, for while most of the latter continent lies within the Tropics, almost the whole of North America lies outside them. We shall find here regions with a climate unlike that of any we have studied previously.

TEMPERATURE

Study the isotherm map for January given in Fig. 25, remembering that such a map is constructed as explained in Chapter III. You will notice that at least half the country has an average mean temperature for the month of January below freezing point while the northern half of Canada is actually below zero at this time. Try to consider what this will mean in these areas. All rivers and lakes will be frozen over, the country will be snow-bound and agricultural work will be at a standstill for several months. Hudson Bay and the seas to the north are frozen up for the greater part of the year, and even the estuary of the St. Lawrence River is closed to navigation from November to April. Sometimes even the great Niagara Falls between Lakes Erie and Ontario are frozen solid for short periods!

We have already learnt two things that will help to explain these low winter temperatures, viz., the small angle at which the sun's rays strike the ground at places far from the Tropics, especially in winter time, and also the few hours for which the sun is above the horizon at this season in high latitudes. Indeed, in the parts of Canada within the Arctic Circle the sun never gets

above the horizon at all for several weeks around Christmas time

But the winter cold is intensified by the large area of the continent since land loses its heat much more rapidly than does the sea. The trend of the isotherms

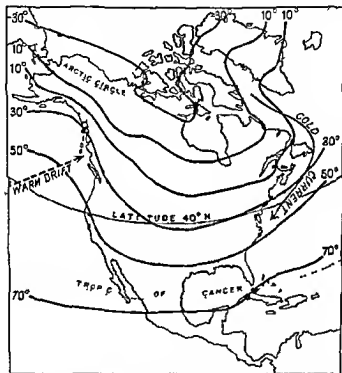


FIG. 25.—January Isotherms for North America, temperatures in degrees Fahrenheit reduced to sea-level

in January shows this quite clearly, for while in latitude 40° N the interior of the continent has a mean temperature below freezing point the ocean on either side is shown to be well above that temperature

The cold winters of Canada are not without their advantages. They destroy insect pests and break up the

soil, thus helping the farmers of the prairies; they keep out the slack type of immigrant, and, as the cold is usually accompanied by long spells of dry, bright weather, they are ideal for exhilarating winter sports of all kinds.

The isotherms show that the west coast of Canada



FIG 26—July Isotherms for North America temperatures in degrees Fahrenheit reduced to sea level."

is not so cold as the east coast, indeed the harbours of British Columbia are open all the year round. This difference is largely due to winds and ocean currents. Canada, like Britain, lies in the broad belt of Westerly Winds, that is to say the commonest wind direction in these latitudes is from some westerly point, usually rather

south of west. These winds come to the west coast from the Pacific Ocean which we have already seen is much warmer than the interior of the continent at this season, and therefore tend to raise the temperature. They also blow towards the coast the warmer surface layers of ocean water which help to keep the harbours ice free.

On the east coast the westerly winds come from the cold interior and therefore tend to lower the temperature. Also a cold current from the Arctic Ocean flows down the east coast from Baffin Bay and Davis Strait, keeping close inshore, while the prevailing winds blow the warmer surface layers of the ocean away from the land, allowing the colder lower layers to well up from below. This "Cold Wall" off the American coast is well known to those who cross the Atlantic from Britain towards Canada and the United States.

In the plains of the United States winters are, of course, less severe than in Canada, but owing to the absence of any great mountain barrier a sudden change of wind from south to north may bring about remarkably sudden falls of temperature in the Central States.

The July isotherms (Fig. 26) show that no part of North America at sea level is frozen up at this time and that the interior becomes very hot indeed. Note how in summer the isotherms bend northward over the land showing that it is then warmer than the sea in similar latitudes. As it cools more rapidly in winter so it heats up more rapidly in summer and places far from the sea therefore suffer from much greater extremes of temperature than those near the coast. Find from the maps the approximate mean January and July temperatures of Vancouver and Winnipeg and compare them.

Notice that in summer the Westerly Winds from the Pacific have a cooling effect on the west coast, while after coming across the warmer land to the east coast they tend to raise its temperature.

It must be remembered that the area on the July

map enclosed by the isotherm of 90° F is not really the hottest part of North America. For this is a plateau region much of which is a mile or more above sea level, and although its day temperatures are high its night temperatures are often very low and even frosty. The actual mean temperature on the plateau is therefore

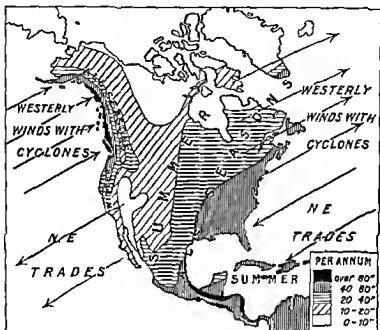


FIG 27—Distribution of rainfall in amount and season

considerably lower than 90° , which represents the temperature "reduced to sea level" as previously explained

RAINFALL

Fig 27 shows the distribution of rainfall in amount and in season over North America, and the reasons for this distribution are fairly obvious in most cases

Within the Tropics are the North east Trade Winds

blowing towards the Equatorial Belt of Low Pressure. In the northern summer this belt moves northwards and the Trade Winds with it, bringing abundant rain to the east coast lands. As the interior of the continent has a high temperature at this time the pressure of the heated air above it tends to be low and the rain bearing winds from the cooler sea blow well inland, bringing summer rains that are very valuable for growing crops. But on the west coast of Mexico and California at this time there is great drought as the prevailing winds blow from off the land, having been robbed of all their moisture by the western Cordilleras. It will be remembered that similar conditions were found in the Trade Wind Belt of South America in corresponding latitudes.

Further north than latitude 40° N is the great Belt of Westerly Winds accounting for the heavy rainfall of the coastal strip of British Columbia. The narrowness of this belt of high rainfall is due to the nearness to the coast of high mountain ranges. The parallel ridges further inland secure a fair amount of rain or snow but the intervening valleys tend to be rather dry and depend upon the rivers and glaciers of the highlands for water for irrigation.

If the West Winds were thoroughly steady throughout the year we should expect Eastern Canada to suffer from drought. But this is not the case. We who live in Britain, which is also in the Belt of Westerlies, know that although the wind in these regions blows most commonly from some westerly point it does not always do so. The West Winds may be likened to a stream whose steady course is interrupted by whirlpools around which the current swirls in circles. Such "swirls" of air, which usually measure several hundred miles across, are the "cyclones" or "depressions" made familiar to us by the daily weather reports. When one of these cyclones passes across Eastern Canada winds may blow into it from Hudson Bay, the Great Lakes or the Atlantic,

and the moisture they bring is deposited as rain or snow

As on the west coast of South America, between the region which receives rain at all seasons from the Westerlies and the desert region which receives little if any rain at any time, lies a region which receives considerable rain in the winter but suffers from drought in the summer. In North America this is represented by the state of California which receives its winter rains from the Westerlies which come southward at that season. In the summer, however, it lies either in the Belt of Calms between the Trades and the Westerlies or has off shore winds which keep rain away from it.

In the extreme north of Canada is a region with very little rainfall, most of which falls in the summer months. This is due to the low temperature which causes the air to take up very little moisture by evaporation, and also to the fact that the prevalent winds of this region are northerly. As these come from colder to warmer latitudes they tend to absorb more moisture rather than to deposit what little they already carry.

Fogs

These have rather important effects upon the climate in some parts of North America. The chief condition for the formation of a fog which is really only a cloud at sea level, is that warm air containing water vapour should be cooled sufficiently for the water vapour to become visible. Fogs are very common off Newfoundland and over the Gulf of St. Lawrence, causing great danger and delay to shipping especially in the summer months. These occur when moist winds blow from the warmer Atlantic and cross over the cold Labrador Current of which we have previously learnt. The danger of these fogs is increased by the fact that the summer, when they are most common, is also the time when icebergs broken from the glaciers of Greenland are most commonly drifted down in the current (Fig 28)

Off the Californian coast summer fogs are also common as there is a cold current along that coast which cools warm moist air that comes in from the Pacific. These fogs make the approach to the harbour of San Francisco rather difficult, they also make the summer temperature of that part much lower than is usual for places in

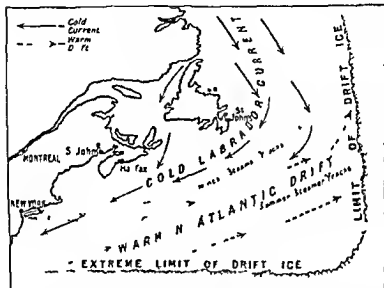


FIG. 29.—Difficulties of Navigation in the N.W. Atlantic (a) Icebergs brought down in the Labrador Current. (b) Fog due to warm moist air from the N. Atlantic Drift blowing into cold air over the Labrador Current.

similar latitudes, but by reducing the intensity of summer heat and drought in the coastal districts they enable fine timber trees to grow on the coast ranges much farther south than would otherwise be possible.

CLIMATIC REGIONS OF NORTH AMERICA

From the above considerations we may divide North America into a number of regions where climatic con-

ditions are fairly distinct from those of neighbouring parts of the continent although, of course, there is not usually a well marked line of separation between one region and the next (Fig 29)

1 *Northern Canada and Alaska* have very long and cold



FIG. 29 — Climatic Regions of North America.

winters with light falls of snow, and short mild summers with light rainfall

2 *Eastern Canada and North Eastern U S A* have cold winters due to the Labrador Current, and warm summers. Rain comes at all seasons from cyclones in the Westerlies and blizzards with heavy snowfall are common in winter. Fogs are frequent in summer off the coast

3 *Central Canada* has very cold winters with some snow, and hot summers with moderate rainfall. The rain and snowfall decrease towards the Rockies from which the westerly winds often descend as a warm dry "chinook" wind in winter clearing the pastures of snow.

4 *British Columbia* has mild winters and warm summers. The seaward slopes especially of the Coast Ranges have abundant rainfall at all seasons with rather more in winter. The valleys are drier. The Pacific Coast of Alaska is similar with rather colder winters.

5 *California* has hot, droughty summers and mild winters with moderate rainfall. Fogs temper the summer heat of the coastal districts.

6 *The Great Basin and Plateaus* have hot summers and cold winters with considerable range of temperature between day and night and very scanty rainfall.

7 *Central U.S.A.* has very hot summers and cool or cold winters with liability to sudden temperature changes at all seasons. Rainfall is scanty with a slight maximum in summer months.

8 *The South Eastern States* have mild winters and hot summers with considerable rain at all seasons, especially in summer.

QUESTIONS AND EXERCISES

1 Between what latitudes does North America lie? Where does the Arctic Circle cross the Continent? What is its latitude? How many degrees is it from the North Pole? When does the sun never appear above the horizon there, and when does it never set below it?

2 Compare the annual range of temperature at Vancouver with that for Winnipeg and St. John's respectively. Explain the differences observed.

3 The mean January and July temperatures of Mexico City are 54° F and 63° F respectively. Compare these with the temperatures shown on the isotherm map and explain the differences.

4 Why is the range of temperature in the West Indies so small?

5 Compare the position of the desert areas of North America with those of South America.

6 Why is there no desert in America comparable in size with the great deserts of Africa and Australia ?

7 Why is there no desert in North America in similar position to that of the Patagonian Desert in South America ?

8 What island of North America has a climate very similar to that of Great Britain ?

9 San Francisco (lat $37\frac{1}{2}^{\circ}$ N) has a lower mean temperature in July than London (lat $51\frac{1}{2}^{\circ}$ N) What is the reason of this ?

10 Point out and explain the dangers encountered by Atlantic liners approaching North America from Britain

11 What part of North America has a climate like that of the Mediterranean ?

12 In which parts of Canada is the climate most like that of Britain and where is it very different ?

13 What is a ' chinook ' wind ? Where is a similar wind felt in South America ? What is the value of these winds ?

14 What striking differences are there between the climate of Canada and Australia respectively ?

CHAPTER XIV

NATURAL VEGETATION AND WILD ANIMALS OF NORTH AMERICA

As in South America, owing to the great differences in rainfall and temperature, all kinds of natural vegetation, from dense jungle to lifeless desert, are found in North America, but the relative areas of each kind vary greatly as between the two sections of the continent

FORESTS

Tropical Forests are only found in narrow strips along the coasts of Mexico and there is nothing in North America to compare with the vast selvas of the Amazon. But these forests contain similar useful timber and rubber trees and abound in similar gay plumaged birds, monkeys and reptiles

Temperate Forests cover vast areas in North America (see Fig 30). Notice the great belt of forest across Northern Canada from the Atlantic to the Pacific, limited in the north by extreme cold and in the south by the scanty rainfall of the interior. This is very different from a tropical jungle. Most of the trees are tall and straight and there is very little undergrowth. In the colder or drier parts of the forest the trees are of the *coniferous* type, that is they produce their seeds in the form of cones. They also have tough, narrow, needle shaped leaves which are dark green in colour and do not fall off in winter, and the sap of the trees is resinous. By these means the trees are enabled to withstand low temperatures and drought. It is said that in all the vast Canadian forests there are only eight different species of trees including fir, pine, spruce, and tamarack

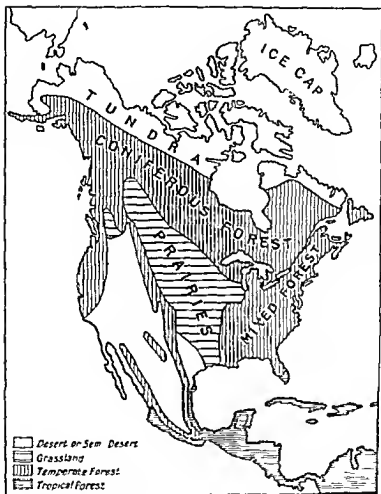


FIG 30 —Natural Vegetation of North America.

as the most common trees. In the coastal districts, where climatic conditions are not quite so rigorous, are found more beautiful *deciduous* trees, so called because they shed their leaves in winter. Among them are the birch, poplar, willow and maple which with their changing colours give distinctive beauty to the spring, summer and autumn landscape as in England. The finest timber trees are found on the Pacific coast where the mild wet climate encourages the growth of those forest giants, the Douglas Fir of British Columbia, the Red Wood or Oregon Pine and the Sequoia or "Big Trees" of the Sierra Nevada in California. Specimens of these have been known to exceed 300 feet in height and 30 feet in diameter!

These forests provide timber for all purposes, wood pulp for making cheap paper, bark for the canoes of the Redskins, and for tanning, resin, turpentine, and even sugar, the last being obtained from the sap of the Canadian maple. The remoter parts of the forests abound in animals which have beautiful thick fur to protect them from the winter cold, and which are therefore hunted for their skins. Among these animals some of the best known are the fox, squirrel mink, ermine and sable. The beaver, which shows great intelligence in cutting down trees, constructing dams and diverting streams in the forest, and the otter, are two animals which live near the water, feeding on fish, and are also hunted for their skins.

We shall learn more of the forest industries in later chapters. They are so important that the Governments of Canada and the United States both take measures to protect the forests and the animals from wanton destruction. Trees are planted to replace those cut down, regulations as to the hunting of animals are enforced, and great precautions are taken to prevent the disastrous forest fires which are so easy to start and so difficult to stop in the hot dry summer weather.

Much of the forest land, especially in the eastern states, has been cleared, as in Britain and Europe, to make room for pasture, cultivation and mining

THE GRASS LANDS

These cover almost as great an area as the forests of North America which surround them. They owe their lack of trees mainly to the scanty rainfall of the interior. As most of the rain also comes in the warmer months it is soon evaporated and does not sink in far enough to supply moisture for big trees. But grass, the roots of which do not penetrate far into the soil and which flowers and seeds in a few weeks, thrives well under these conditions, and is not harmed by severe frosts in winter. Much of the grass land in the better watered *Prairies*, has been ploughed up to grow grain crops, which are simply cultivated grasses. On the higher and drier *Western Plains* vast areas still remain in a primitive state, although new methods of economizing water supplies and the production of new kinds of grain which thrive in harder conditions are extending the cornlands northward and westward every year.

Over these vast grassy plains once roamed herds of *bison*, or American buffalo, which were hunted by the native Red "Indians" to provide meat and materials for tents and clothing. Their places have now been taken by herds of cattle and horses and flocks of sheep, tended by the "cowboys," and the bison can only be seen in the great national Parks among the Rocky Mountains where they are preserved from extinction.

DESERTS

In North America these are of two kinds—hot deserts and Tundra or frozen deserts the latter being the larger (see Fig. 33).

The Tundra or Barren Lands of Northern Canada and

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Alaska extends some three hundred miles inland from the shores of the Arctic Ocean, which is frozen over for most of the year. The winter is long and dreary, the sun never appearing above the horizon for several weeks in the northern portions and only being seen for a few hours a day in any part. In the long summer days also the sun does not rise very high in the sky so that the region receives very little heat at any time. The amount of rain or snowfall is very small. This climate is unsuited to most forms of vegetation and only hardy shrubs and stunted bushes manage to exist in more favoured spots. Some of the latter produce berries which ripen in the long hours of summer sunshine and provide food for man and beast. The trunks and branches of stunted trees and also vast areas of the ground are covered with grey lichens and green mosses which form the chief food of the *caribou*, a kind of large deer, which is the largest animal of the region.

The upper courses of the rivers which cross the Tundra lie in warmer latitudes, and thaw while their mouths and the sea are still frozen. This causes great stretches of the lowlands to become flooded, resulting in marshes which in the summer time are infested by swarms of waterfowl who migrate northward in the nesting season from their warmer winter quarters in the far south. The rivers, lakes and seas abound in good edible fish which form an important item of food for the Eskimo and other tribes of the Tundra. Other well known animals of this region include the *polar bear*, which lives on the shores of the Arctic Ocean and catches fish for food, and the *arctic fox*. The fur of the latter animal is grey in summer and white in winter, and this assists it in catching the ptarmigan and other birds on which it feeds. Some of the birds also change their plumage as the colour of their surroundings changes with the seasons.

The Hot Deserts of North America lie on the plateau

enclosed between the main eastern and western ranges of the Cordilleras in northern Mexico and the adjoining portions of the United States—New Mexico and Arizona. We have seen that very high summer temperatures are here experienced and winds from any direction lose their moisture in crossing the bordering ranges. It is in the desert of Arizona that the Grand Canyon of the Colorado River has been excavated as already described. The only natural vegetation of this region consists of enormous cactus plants whose juicy pulp is protected by thick tough skin covered with prickly spines. Owing to the cloudless skies of this desert region one of the most famous observatories in the world, the Lowell, is situated in Arizona.

QUESTIONS AND EXERCISES

1 Compare the belts of natural vegetation in North and South America.

2 Which characteristic animals of North America are not to be found in the southern half of the continent and vice versa?

3 Describe the gradual changes in the landscape that would be observed in an aerial voyage from the Gulf of Mexico to the Arctic Ocean.

4 Why is there some similarity between the rainfall and vegetation map of a continent? Why are they not exactly similar?

5 Contrast the natural vegetation of Canada with that of Australia.

6 Describe the changes of scenery that would be observed in a cruise along the west coast of America. What differences would be observed in a cruise along the east coast?

7 In what parts of America are the trees evergreen? Give reasons in each case.



CHAPTER XV

HISTORY AND PEOPLES OF NORTH AMERICA

We have in previous chapters learnt something of the physical characters of the continent, its highlands and lowlands, its rivers and lakes the frozen north and hot and steamy lowlands of the Gulf of Mexico, the great forests and grasslands, the tundra and the deserts. Let us now learn something of the peoples that have found their home there and the way their lives have been influenced by these geographical factors

THE NORSEMEN AND THE ESKIMO

The Norsemen were the first to bring to Europe an account of any part of North America. Old records, long since forgotten but unearthed in modern times, show that in the tenth century some enterprising Norwegian colonists in Iceland went further westward and established settlements on the coast of Greenland, probably with a view to extending their whale fisheries in Arctic waters. Some of these settlers seem to have left their rather uncongenial climate and sailed southwards discovering the pine forests of eastern Canada and, still further south, a land where the trees bore fruit, including grapes, and which they therefore called Vinland. Settlements were made but afterwards abandoned and forgotten for centuries.

These Norsemen came in contact with the native *Eskimo* peoples of the Tundra and their accounts of them show that these folk then lived in almost exactly the same way that they do now, making the most of the very difficult circumstances in which they find themselves

They are a stunted people with yellowish-brown skin, rather oblique eyes and straight black hair like the peoples of eastern Asia. One of their chief problems is to keep warm in their inhospitable climate, and this accounts for what seem to us their rather repulsive habits of seldom washing or removing their clothes, and of eating vast quantities of whale fat and seal-fat, often uncooked. The word Eskimo is an Indian one meaning "eaters of raw flesh." Their clothing consists of garments made from the warm skins of seals, polar bears, caribou, or even of birds, sewn together with sinews of animals by means of needles made of bone. The women make the clothes while the men go out to hunt, and similar garments are worn by both men and women. The summer dwelling is a skin tent supported on poles of driftwood brought down by the rivers which flow from the forests to the northern ocean in the summer months. The tent can easily be packed when it is necessary to move on in search of animals, birds and fish. The summer diet is varied by seeds of berries, the only vegetable food known to the Eskimo. The winter hut, or *igloo*, is built of blocks of ice and is entered through a long low tunnel which helps to keep out the cold winds. A lamp or stone basin, filled with seal oil, serves to give light and heat to the hut, and to do such cooking of flesh and fish as may be desired.

Bows and arrows, harpoons and axes, all made from bones, stone and wood, unless iron has been purchased from outsiders, are their chief weapons, in the making use and ornamentation of which they show considerable skill. Fishing lines are made of twisted sinews, as also are the slings, used like the bolas of the Patagonians (see p. 33), for catching birds.

Land transport is carried on by means of sledges, made of driftwood and large bones, drawn by the Eskimo dogs which are probably descended from forest wolves and act as scavengers as well as beasts of burden.

Fishing expeditions in summer are made in *kayaks* or canoes. These consist of a light wooden or bone framework completely covered with hide and accommodating a single Eskimo who propels his craft with a long double-bladed paddle.

The Eskimo have remained self supporting for ages, but they now purchase, chiefly from Danish trading stations in Greenland, such luxuries as blankets, knives, tobacco and matches in return for surplus skins. They are a happy, intelligent, kindly, well disposed people in spite of all their hardships, and many of them have learned to read and write at the missionary stations which minister to their bodily and spiritual needs.

THE SPANIARDS AND THE "INDIANS"

Whether Columbus had ever heard anything from anybody of the old Norse settlements in Greenland and North America seems very doubtful indeed, and his expedition in 1492, of which we have already learnt (p. 39), is always hailed as the Discovery of the New World. Various Spanish explorers soon followed in his track, landing at many points in Central and South America, as we have seen, and spoiling the "Indians," as Columbus called the natives of these regions, from his belief that he had reached the Indies. The first big Spanish expedition into North America was that of Cortes, who descended upon Mexico in 1519 and by 1521 had conquered the highly civilized native *Aztecs*.

These people inhabited the high plateau above the hot and steamy forests that covered the slopes down to the Gulf. They built temples, palaces and houses of stone, and cultivated maize as their chief foodstuff, using sugar and various spices from the lowlands to flavour the cakes and soups made from the maize flour. Chocolate made from the beans of the cocoa plant was a favourite drink. They wove cloth from cotton which grew wild and also from the fibres of the aloe, a tall,

thick leaved plant characteristic of Mexico. They mined copper and tin from the mountains to make bronze implements and weapons and were skilful workers in gold, silver and precious stones, making the costly and beautiful vessels and ornaments which excited the greed of the Spaniards. The Europeans armed with steel weapons, gunpowder and greater cunning were however, able to overcome them. The story of *The Conquest of Mexico*, written by Prescott, is a thrilling narrative.

The Spaniards pushed their conquests northward as far as California on the plateau and along the west coast, and the Spanish names of mountains, rivers and towns—on the map of this part of the continent speak of their settlements. The very common names of saints indicate that, as in South America the Europeans brought a curious mixture of missionary zeal with their greed for gold and conquest.

The Red Indians of the prairies, living in a land where there was no gold to be had escaped the attention of the Spaniards. They were more primitive hunters and fishers and lived a wandering life, so that they had no settled civilization and cities like those of the Aztecs. The bison, or buffalo, which roamed in herds over the grass-land provided them with meat and with hides for the making of clothes and for covering their wigwams, but they never learned to domesticate it. The women sometimes cultivated patches of maize, or Indian corn, and tobacco, the smoking of which was a favourite habit. Horses released by the Spaniards ran wild and increased enormously in numbers, and the Indians were not slow to learn the art of capturing and riding these animals to help them in the chase. Their weapons consisted of bows and arrows, wooden clubs and the tomahawk, a sort of axe with wooden handle and head of stone, or of iron if that could be obtained. They constructed canoes of birch bark stitched with sinews to a light

wooden framework for transport and fishing on the great rivers of the plains, and they made snowshoes of wood and strips of hide to glide over the snow covered prairies in winter

These Indians lived in tribes, acknowledging the rule of chiefs who had proved their prowess in war. Some of these copper coloured chiefs, with fine physique and features and decked out with feathered head dress, beads and paint, looked very fine, and their hardy and well disciplined tribesmen put up a strong opposition to the coming of the Europeans

In the drier districts of New Mexico and Arizona lived, and still live, more settled Indian tribes dwelling in caves on the mountain sides, or in one-roomed houses built of sun dried brick and grouped together in large numbers for defence. Some of these settlements were perched on top of the flat topped *mesas* left by the excavations of the rivers (Fig. 39). These *Pueblo Indians*, as the Spaniards called them, practise the arts of irrigation for the cultivation of their fields of maize and cotton and are skilful weavers and potters

FRENCH AND BRITISH IN NORTH AMERICA

The Spanish conquests in North America were confined, as in South America, to the districts rich in the precious metals, that is in Mexico and the plateau running northward from it, and as in South America their rule gradually came to an end. Meanwhile French and British were busy founding settlements along the Atlantic coastlands while Sir Francis Drake in his memorable voyage round the world had landed upon the Pacific coast of North America and claimed part of it for Britain

In 1534 Jacques Cartier, a Frenchman, sailed across the Atlantic to Newfoundland, noted the wealth of fish in the shallow seas around it, and entered the Gulf of St. Lawrence in the summer time, finding the wooded shores very pleasant and promising. On subsequent

voyages he sailed further up the river and discovered Indian settlements on the present dry sites of Quebec and Montreal. These voyages were followed by the settlement of French colonists along the shores of the great river where they cut down the forest to cultivate the ground and traded with the Indians for furs. A few adventurous Frenchmen explored the Great Lakes, and in 1682 La Salle and a few followers leaving Lake Michigan carried their canoes overland to the Mississippi and succeeded in following that great river down to its delta in the Gulf of Mexico. The names of the state of Louisiana, the seaport of New Orleans, and many others remind us of the early French colonization of this region.

The British had meanwhile been active on the Atlantic coast. Many English vessels sailed to the cod fisheries of the Banks of Newfoundland and this island, which had been discovered by John Cabot in 1497, was annexed as a British possession in 1583. Sir Walter Raleigh had tried to establish colonies of settlers on the coastal plain of Virginia which was so named in honour of Queen Elizabeth, but the poor quality of the settlers and attacks of the Indians put an end to the early attempts. The introduction of potatoes and tobacco from this region into Britain, however, resulted from these ventures. Further settlements were made in 1620 by the Pilgrim Fathers, a very earnest band of settlers fleeing from religious persecution, and these were followed by others who, in the face of many hardships, established prosperous farms in what are still known as the New England States of North America. Advance into the interior was hindered by the ridges and valleys of the Appalachians and by the settled Indians who objected to the intruders. This opposition was eventually overcome and advance into the interior was made by way of the valleys of the Hudson and other rivers. Here, however, the British settlers came into conflict with the French who, we have

seen, had reached the Mississippi from the St. Lawrence behind the Appalachians and endeavoured to prevent the British expansion beyond this line (Fig. 31). This at last led to war, and the British, more strongly supported from home than the French, were victorious. Wolfe's famous victory over Montcalm at Quebec in 1759 put

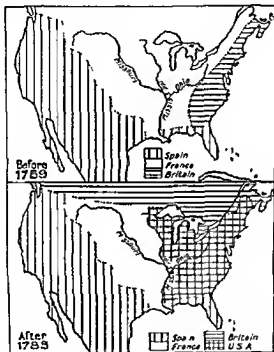


FIG. 31—Claims to North American territory in the eighteenth century.

an end to French rule in North America, but the French settlers remained, and French is still the chief language spoken by the Canadians of Quebec Province.

In 1776 thirteen of the American colonies declared their independence of Britain and, succeeding in the war with the mother country that followed, set up the republic

of the United States of America in 1783 This gradually expanded by purchase of French and Spanish territories till it now includes forty eight States between the Atlantic and the Pacific, and with more than a hundred million people it is the largest and wealthiest single country in the world

Canada to the north has also expanded, but not quite to the same degree, owing to less favourable natural conditions, but it has become the greatest of the self governing dominions of the British Empire We shall learn much more about these two great countries in later chapters

The advance of the white man with his modern ways of farming, mining and forestry does not seem to have greatly benefited the native Indians, who are dwindling in numbers and now mainly live on "Reservations" in the United States and Canada, where some carry on a settled farming life, but many live on charity in very wretched conditions A few still engage in hunting the fur bearing animals of the forest, some have become wealthy landowners, and some, having passed through the Government schools, have become absorbed in the various activities of modern life

THE NEGROES OF THE U S A

These people, numbering some ten millions, are descendants of negroes brought from the forests and savannas of Central Africa as slaves to work on the Spanish, French and British plantations of rice, cotton, sugar and tobacco round the Gulf of Mexico The slaves were freed after the great American Civil War of 1861-5 in which the slave-owners of the southern states were defeated by the northern farmers Many of the negroes' old plantation melodies are well known in Britain still The descendants of the freed negroes still work on the plantations of the southern states, in several of which they

form half of the total population, and they are gradually taking up work in all sorts of industries further north. But although many of them pass through the Schools and Universities of the States their colour seems to be a bar to their mixing with the whites on an equal footing, and the steadily increasing negro population of the United States is one of its greatest problems (Fig. 32)

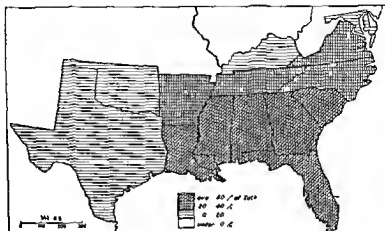


FIG. 32—Negro Population in the United States

The States have another "colour problem" in the large number of yellow men from China and Japan who have crossed the Pacific to find work on the western coastlands especially in California, where they are largely engaged in domestic work and in farming. Efforts to exclude them are often a cause of friction between the Governments of the United States and Japan, and British Columbia in Canada is not entirely free from similar difficulties.

QUESTIONS AND EXERCISES

- 1 Compare on a globe the routes of the Norsemen and of Columbus in the discovery of America
- 2 What are the difficulties against which the Eskimo has to contend? How does he deal with them?
- 3 Compare the life of the "Indian" of the prairie with that of the "Indian" of the Amazon forest
- 4 Why were the highest civilizations of ancient days found on the high plateaus of America?
- 5 Compare the Aztec and Inca civilizations as far as you can
- 6 Contrast the methods of the Spanish and British settlers in North America
- 7 Discuss the statement, "The development of a region is controlled by its geographical conditions," with special reference to N. America
- 8 Why is French still commonly spoken in Canada? In what other British dominion are there two "official" languages?
- 9 Point out half a dozen names on the map of North America which are probably of (a) Indian, (b) Spanish (c) French and (d) British origin respectively
- 10 Why does the flag of the United States carry forty eight stars and thirteen stripes?
- 11 More than a third of the total population of the following States of the U.S.A. are negroes—Mississippi, S. Carolina, Georgia, Louisiana, Florida, Alabama, Virginia, N. Carolina. Account for this
- 12 Compare and contrast the spread of British colonists in Australia and in North America respectively
- 13 What well known English songs are reminiscent of negro slavery in the American plantations?

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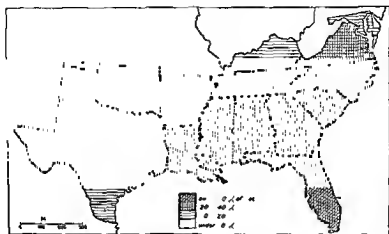


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CHAPTER XVI

THE DOMINION OF CANADA INTRODUCTORY

This the first and greatest of Britain's self governing Dominions is nearly as large as the whole of Europe and is slightly larger than the United States. But although its area is almost three and three quarter million square miles its population is less than nine million not many more than that of Greater London! The original Provinces of the Dominion established in 1867 were Quebec and Ontario Nova Scotia and New Brunswick. The land which now comprises the Provinces of Manitoba Saskatchewan and Alberta and the northern Territories was taken over from the Hudson's Bay Company, which had developed the fur trade of the northern forests. British Columbia a colony isolated by the Western Cordilleras agreed to join if a trans continental railway were laid down to connect it with the eastern Provinces and Prince Edward Island came in last. Each of these nine Provinces has a Parliament for the management of its internal affairs but also elects members to the Dominion Parliament at Ottawa which controls affairs concerning the whole country. The King appoints a Governor General to represent him in Canada.

Notice that the greater part of Canada's southern boundary is the line of latitude 49° N and that the Dominion is marked off from the United States territory of Alaska by the line of longitude 141° W. It shares all the Great Lakes except Michigan with the United States but occupies both banks of the lower St. Lawrence. The whole of this long frontier is unfortified.

Although Canada is a very loyal unit of the British Commonwealth of Nations it must be remembered that

the bulk of its people are now Canadian born although they may trace their descent to French or British ancestors. They have done much to develop their great country, as we shall learn, and they rightly regard themselves as Canadians and not as British colonists, and are very proud of the fact that they now count as a separate unit in the League of Nations.

The vastness of Canada may perhaps be realized by remembering that the railway journey from Halifax on the Atlantic to Vancouver on the Pacific takes nearly six days. But although the Dominion also extends through more than twenty degrees of latitude nearly all its people live within three hundred miles of its southern boundary.

We have seen that in physical features, climate and natural vegetation there are distinct differences between eastern, central and western Canada, and as these differences are reflected in the occupations of the people we will consider them separately at first. Afterwards, by a study of the waterways and railways, we shall see how they are all linked together in the common service of the Dominion, the Empire and the World.

QUESTIONS AND EXERCISES

1. From the following figures construct diagrams showing the relative size and population of Canada, the other Dominions of the British Empire, and the British Isles. Take 1 sq. inch to each million square miles and 1 dot for each million people.

Canada	3,730,000 sq. miles,	8,788,000 people.
Australia .	2,975,000	" 5,437,000 "
South Africa	473,000	" 6,929,000 "
New Zealand	105,000	" 1,219,000 "
British Isles .	122,000	" 47,000,000 "

Comment on any striking facts shown by your diagrams.

2. Why is it wrong to say, "Canada belongs to England"?

3. What are the advantages and disadvantages of lines of latitude and longitude as frontiers? Why are they more commonly used as such in the New World than in the Old?

CHAPTER XVII

EASTERN CANADA

This may be regarded as the five eastern provinces, a land of old hard rocks, much influenced by the work of ice in the Great Ice Age, a land of cold winters, hot summers and abundant rainfall, a land mainly covered with forests but in which valuable farm lands have been cleared by the settlers, a land rich in minerals and fish, and one in which great natural supplies of water power are being harnessed in the service of industry. Being nearest to Europe this was the first part of Canada to be settled by white men, and is therefore the most fully developed. Within it now live two thirds of all the people of the Dominion. Let us see how they manage to get a living.

FOREST INDUSTRIES LUMBERING AND TRAPPING

Although, as we have seen, the eastern forests do not contain the finest timber trees, yet they are very accessible to the treeless prairies and to the most thickly peopled parts of the United States and of Western Europe, and therefore in them lumbering, or the cutting down of timber for building purposes, has been most fully developed. The lumberers work in gangs of about fifty men and fell the trees in the winter months living and sleeping meanwhile in a rough log hut, to which supplies of food are regularly sent out, as the lumber camps are naturally many miles from a town. The logs are drawn over the frozen snow covered ground to the banks of the nearest river by teams of horses, and are there piled up on the banks or even on the ice. When the ice breaks up in spring the logs are either floated down singly or

chained into rafts, according to the width of the stream, and when a big river or lake is reached the rafts are taken in hand by a steam tug and towed to the nearest saw-mill. The sawmill is usually situated by a waterfall, where power can be obtained for driving the machine saws that cut the larger logs into planks and the smaller ones into pit props for use in mines, after which the products of the sawmills are sent by rail or ship to their destination.

Much of the smaller and softer timber is now torn up in the pulp mills to make wood pulp, the raw material from which most newspapers are made. The demand for paper for this purpose in the United States alone is enormous, and Eastern Canada supplies the bulk of it. Much wood pulp chemically treated also goes to the making of artificial silk.

The chief lumbering areas are along the Ottawa and Saguenay Rivers, but the industry is also important in New Brunswick and Nova Scotia. As the lumbering is most conveniently carried out in winter when the ground is frozen, and there is less sap in the trees, while the saw-mills and pulp mills, which use water power, can only work in the summer, many of the men spend their winters in the forest and their summers at the mills.

Further north, where the trees are of little value for timber and the forest is undisturbed, the chief industry is the trapping of the fur-bearing animals, which is often carried on by Indians. The trapper, often quite alone, builds his hut in winter in the silent forest and goes out daily on his snow shoes to set his traps and collect his catches. Returning he skins the animals and prepares their skins for the fur trader. When the winter breaks up, and trapping is not so easy, nor the furs of the animals so fine, he collects his pile of skins and paddles downstream in his birch bark canoe to a fort or station of the *Hudson's Bay Company*, where he can sell them and purchase supplies of food, clothing, tobacco, traps and other

articles of use or luxury In the few months when Hudson Bay is free from ice many ship loads of furs leave Port Nelson for Liverpool and other ports of wealthy countries where the winters are cold enough to make fur coats welcome as well as fashionable We might notice here that the Hudson's Bay Company which was established in 1670 did perhaps more than any other body to explore the interior of Canada and make it known to the world Many a flourishing Canadian city began as a fur trading station and many a famous Canadian citizen started life in the service of the Company

An interesting modern development of the fur trade is the establishment of farms for breeding silver foxes on Prince Edward Island and elsewhere

The maple a common tree of the eastern forests deserves special mention It is a deciduous tree losing its leaves in autumn when the sap descends to the roots to prevent the tree from injury in the winter frosts The golden leaves of the maple are one of the glories of the Canadian autumn or 'fall' as it is usually called and the Maple Leaf has been adopted as the emblem of Canada In spring when the sap rises if a small hole is bored in the tree a bucket placed beneath will collect the sap which oozes out From the sap sugar is obtained by boiling and the maple sugar industry is important in southern Quebec The timber of the maple is also very ornamental and is used in decorative work

AGRICULTURE DAIRY AND FRUIT FARMING

during the summer, or on cattle cake. Prince Edward Island is a famous dairy farming province, while Ontario produces enough butter and cheese to supply all Canada and to leave vast quantities of "Canadian cheddar" for export.

The hot summers of the Lake Peninsula of southern Ontario bring many fruits to perfection, including peaches and grapes, olives and figs, as well as the common British varieties. This has led to a considerable export trade in fresh, dried and tinned fruits. Sugar beet is also grown in the same region. The apple orchards of Nova Scotia and New Brunswick along the shores of the Bay of Fundy have long been famous, and supply thousands of barrels of apples for the British markets.

MINING

Eastern Canada is very rich in minerals. About half of the Dominion's coal supply comes from Nova Scotia, the richest mines being near *Sydney*, in Cape Breton Island. This port sends out coal to Montreal, to the United States ports on the north east coast, and to Newfoundland. Iron ore is also worked and smelted in Nova Scotia, near *Sydney* and *Glasgow*, and on the north shore of Lake Superior near *Sault Ste. Marie*.

The old hard rocks north of the great lakes contain rich supplies of *gold*, *silver*, *nickel* and *copper*, and *Sudbury* is the centre of a great mining district. Nickel is a very useful metal used for coinage, for giving hardness to steel, and in electroplating. Ontario has the bulk of the world's supply of nickel.

From the south shore of the St. Lawrence in Quebec also come the world's largest supplies of *asbestos*, a curious mineral which can be shredded into fibres from which fire-proof materials can be made.

In the south west corner of the Lake Peninsula of Ontario are some valuable oil wells from which *petroleum*

is pumped From petroleum such useful products as paraffin, benzene, petrol and vaseline are distilled

MANUFACTURES

With the raw materials obtained from forests, farms and mines and with coal water falls and oil to supply power for machinery Eastern Canada is rapidly developing varied manufacturing industries As Canada becomes more thickly peopled, giving greater labour supplies and greater markets for finished products, these will tend to increase Sawmilling, wood pulping, paper making and iron smelting have already been noted, but other industries include flour milling, sugar refining, textile industries, tanning, and the making of all kinds of machinery—locomotives, agricultural implements and motor cars

CITIES OF EASTERN CANADA

Montreal the largest city and commercial capital of the Dominion, grew up on an island in the St Lawrence, near the confluence of its great tributary, the Ottawa and where the valley of the Richelieu gives an easy route southward to the Hudson valley and New York (Fig 33). At its wharves the great lake steamers bringing down grain and minerals, meet ocean going vessels bringing manufactured goods and other raw materials of industry for exchange All the waterways that converge on the city have now their parallel roads and railways, bringing trade to Montreal, which is the headquarters of the great Canadian Pacific Railway It is a finely laid out city, with magnificent public buildings and a fine park on the slopes of Mount Royal, from which it takes its name The Lachine Rapids of the St Lawrence, just above the city, supply it with power for lighting, transport and industry Its only drawback is the freezing up of the river for about five months every winter, but this

also gives facilities for the winter sports for which Montreal is famous

Ottawa, the Dominion Capital, grew up near the Chaudière Falls, which set a limit to the navigation of the Ottawa, and provide power for its sawmills and pulp mills. It is also at the confluence of the Rideau River,

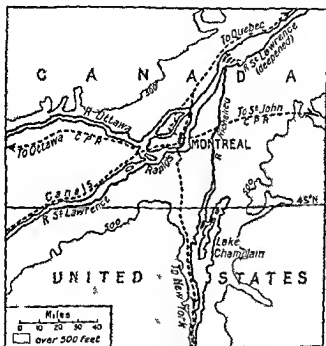


FIG. 33—Factors in the Growth of Montreal

whose valley provides a route for a small ship canal to Lake Ontario. It was chosen as capital by Queen Victoria to avoid the jealousies of the larger cities, and because it was centrally situated as far as the bulk of the population of Canada was concerned. Its magnificent Parliament Buildings are the great feature of the city, and it is also on the main line of the C.P.R.

Toronto, the second largest city of Canada and capital of Ontario Province, is finely situated on Lake Ontario in the heart of the fertile Lake Peninsula. The Provincial Parliament Buildings and University are very fine, and it has large manufacturing industries. It is an important port for trade with the United States. *Hamilton*, at the western end of the lake, is another city of more than a hundred thousand people, and it has important iron industries. Both places are great railway centres.

Quebec is not only a provincial capital, but the most interesting city historically in the Dominion. The early French settlement grew on the slopes of the commanding Heights of Abraham, overlooking the St. Lawrence, and most of the inhabitants to day still speak French. Local farms and forests supply the raw materials of great leather industries. It is the terminus of a transcontinental railway, and of railways to Ottawa and the winter ports on the Atlantic, and although the deepening of the St. Lawrence for large vessels up to Montreal has diminished its commercial importance, it still has a considerable summer trade.

Halifax the capital of Nova Scotia, is one of the winter ports of the Dominion as its harbour is never frozen up. As the harbour is also deep and commodious and within easy reach of the Atlantic coast, it is a great centre for the trade of the Maritime Provinces. It is a great naval base, and has a large shipbuilding industry. It is also a great centre for the trade of the Maritime Provinces, and has a large commercial importance.

St. John is the chief seaport of New Brunswick, and as it is the terminus of the C. P. R. and is never frozen over its trade is very great, especially in the winter months when the St. Lawrence is closed by ice. It is connected by the St. John River and by railway with *Fredericton*, the provincial capital, which has important lumbering and wood pulp industries.

QUESTIONS AND EXERCISES

1 Why is winter the best season (a) for lumbering (b) for trapping?

2 What articles in use in Britain are products of the Canadian forests?

3 Describe the life of an Englishman in a fur trading station of the Hudson's Bay Company.

4 What is the latitude of the Lake Peninsula of Canada? What countries of Europe are in the same latitude? Why are they all famous for their fruit?

5 Why has the wood pulp industry become so important in Eastern Canada?

6 Draw sketch maps indicating geographical factors that have helped the growth of Ottawa, Toronto and Halifax respectively.

7 In 1921 Canadian cheese factories had an output of 162 million pounds weight. Of these 103 came from Ontario, 54 from Quebec and 5 from Prince Edward Island. Illustrate by a diagram and comment on the facts shown.

CHAPTER XVIII

THE PRAIRIE PROVINCES OF CANADA

THE WHEAT LANDS

South of the great Forest Belt in the three provinces of Manitoba, Saskatchewan and Alberta lies one of the world's greatest granaries, producing enough wheat for all Canada and leaving much to spare for the thickly-peopled manufacturing districts of both the Old and the New World

As in East Anglia there is in this region a fertile soil largely due to the grinding and mixing brought about by the movements of the Ice Sheet, as we have seen. The layer of fine soil is thickest and most fertile in the basin of the Red River over which in the Ice Age extended a great lake until the retreat of the ice caused it to be drained northward by the Nelson River, leaving the present Lakes Winnipeg and Winnipegosis to mark its ancient bed. There is also an ideal climate for corn growing. The intense cold of winter kills off grubs and insects and breaks up into fine soil the clods turned up by the plough in autumn. The melting snow in spring and light summer rains provide enough, but not too much, moisture for growth, and the hot summers make the ripe grain fine and hard for milling into flour. As the rainfall is not sufficient for trees the land needs no clearing before it can be ploughed, and all that was necessary to turn the prairie into cornland was hard work, machinery capable of dealing with the vast areas, and railways to carry the surplus grain to the ports. The levelness of the prairies greatly helped all these developments.

Manitoba, being nearest to the early settlements of Eastern Canada, was the first part of the prairies to be developed, but cultivation has spread rapidly westward

and northward till scanty rainfall or early frosts prevent the crops from coming to perfection. New methods of conserving moisture and new varieties of grain perfected by scientific research in the agricultural colleges of the Dominion, enable more and more land to be brought under cultivation each year. Saskatchewan has now the largest area under wheat, and the grain is also grown in large areas of western and northern Alberta.

One difficulty is that all the wheat comes to perfection within about a month of the end of July and beginning of August, so that in spite of the best modern self-binding machinery, drawn by teams of horses or petrol-driven tractors, it is often difficult to get sufficient labour to get the crops reaped; and when the harvest is gathered and the corn threshed out one of the finest railway systems in the world is taxed to its utmost to get the millions of bushels of corn to the markets and the ports. For this reason huge iron storehouses, or "elevators," may be seen at every prairie station where the grain can be safely housed until it can be disposed of.

Most of the grain goes by railway to ports on the Great Lakes, where it is pumped from the trucks into elevators. It is then sorted and graded and finally poured from the elevators into the holds of lake steamers waiting to take it through the Great Lakes to the cities of Eastern Canada for consumption or export. It should be remembered that the prairie wheat lands extend into the United States, and the crop from this region adds to the congestion of the Lake Traffic in the few months between the harvest and the closing of the route by ice (*see* Fig 36, p 133). This has led to projects for widening and deepening the canals connecting the lakes, to the construction of a railway from the prairies down the Nelson Valley to Hudson Bay, and to the transport of grain from the western areas by railway to Vancouver on the Pacific coast, whence it can reach Britain by way of the Panama Canal at any season of the year.

Owing to the relative cheapness of the land in the prairies the Canadian farmer can sell his grain at such a price that after all the costs of transport, of insurance, and of wages to the buyers and sellers through whose hands it passes, have been added to it, the grain can be sold in Britain at a price with which the home farmer sometimes finds it difficult to compete.

It must not be thought that wheat is the only crop grown on the prairies, although it is by far the most important. Other grains, root crops, hay, peas and beans, and even flax, hemp and sugar-beet, are now cultivated by many of the farmers, who also keep a few dairy cattle and grow fruit trees and vegetables around their homesteads. Although the farms often cover very large areas and farmhouses may be miles apart, railways and motor cars, telegraphs, telephones and "wireless" now help the farmer and his family to keep in touch with his neighbours and the rest of the world, and all along the railway many flourishing little townships, with shops, schools, churches and places of amusement, are rapidly growing up.

Winnipeg, the capital of Manitoba and earliest centre of the wheat lands, has grown from the Hudson's Bay Company's fur station of Fort Garry to the third largest city in Canada in fifty years, and now has about 180,000 people. It grew up at the junction of the Assiniboine with the Red River, whose fertile valley has already been mentioned (Fig 34). The coming of the railways added to its importance, routes converging upon it from many directions on the prairies to avoid Lake Winnipeg on their way to the east. It is still a collecting centre of timber and furs from the forests, as well as grain and cattle from the grasslands, and has large flour mills and factories for making agricultural machinery.

Regina, the capital of Saskatchewan, is another rapidly growing city with similar industries.

CATTLE RANCHING

On the higher and drier plains at the foot of the Rocky Mountains, where the mean annual rainfall is less than 20 inches, most of the grassland is given over to herds of cattle and horses which have replaced the wild bison. The pasture is of course not rich, as in the cleared forests of the east, or of the cattle-rearing districts in Britain,

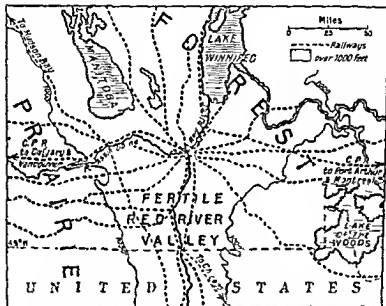


FIG. 34.—Winnipeg: River Confluence and Railway Junction, Market of Forest and Prairie

and vast areas of land are necessary, the "ranches" being measured in square miles and not in acres, while the men who round up the cattle for branding or for sale must be mounted on horseback. The Canadian "cow-boy" is, like the "gaucho" of Argentina, a very skilled horserider. Full grown cattle are sent to richer pastures in the irrigated lands along the rivers, or even by rail to Eastern Canada to be fattened for market. The cattle

remain in the open all the year round, as the snowfall is light, and the "chinook" winds, which are warmed by compression in descending from the Rockies, prevent the dried grasses from remaining snow-covered for long periods.

Calgary, in Alberta, is the greatest of the ranching centres and the valley of the Bow River on which it stands is now becoming a prosperous agricultural area under irrigation. It is on the main line of the C P R, and from it radiate important branches. (a) To *Edmonton*, the provincial capital, a centre of cattle ranches and wheat farms, and also of a coal mining district. (b) To the coal mining area near the Crow's Nest Pass in the Rocky Mountains.

QUESTIONS AND EXERCISES

1 In 1922, 23 million acres in Canada were sown with wheat. Of these 13 million were in Saskatchewan 5m in Alberta and 3m in Manitoba. Represent these facts by a diagram.

2 In the same year 11 million acres were sown with hay, including 5 million in Quebec and 4 in Ontario. Compare this with the figures given in Question 1, and account for the difference.

3 Ontario and Quebec provinces each have more cattle than Alberta has. Explain this. Point out the different conditions under which the animals are kept in the two regions.

4 In 1922 the wheat fields of Canada produced an average crop of 17 bushels per acre while those of Great Britain produced 31 bushels per acre. Comment on these facts.

5 Why is the Canadian wheat farmer able to compete with the British farmer in the home market?

6 What are the advantages of the severe winters of Central Canada?

7 Compare the life on a Canadian cattle ranch with that on an Australian sheep station.

8 What part of South America can be compared with Central Canada? What advantages and disadvantages has the former compared with the latter?

9 What facts tend to increase the value of Vancouver as a wheat port?

10 Wheat is often sold by the prairie farmer at a dollar a bushel. The same wheat is sold for almost twice that price in Britain. Whose wages and profits are paid out of the difference?

11 Describe a railway journey from Fort William to Calgary.

12 Imports of wheat and wheat flour into Britain in 1922

CHAPTER XIX

WESTERN CANADA

We have already learnt something of the parallel ridges and valleys of British Columbia, of its snowy peaks and glaciers, the mild climate and magnificent forests of its coastlands. Up till about the year 1850 this region had only been part of the territories owned and exploited by the Hudson's Bay Company, but in that year discoveries of gold brought a rush of immigrants, mainly from California, which had had its gold rush a few years earlier. British Columbia was then made a colony, but as there were no transcontinental railways and no Panama Canal in those days it was very isolated indeed. When the other Canadian colonies joined together into the Dominion in 1867, British Columbia only agreed to join if a railway were constructed to put her in touch with the eastern provinces. This heroic venture was agreed upon, and the Canadian Pacific Railway was constructed through the almost uninhabited forests and prairies and over the high passes of the western mountains by 1885, since when it has been one of the most important factors in developing the life and trade of the whole Dominion, as well as of the Far West.

British Columbia now contains about half a million people mainly dependent on the lumbering, mining, fishing and fruit growing industries of the province.

Lumbering

The forests of the coastal region contain the magnificent Douglas firs, sometimes 300 feet high, as well as valuable cedars and other trees providing timber for all purposes. Most of the timber is exported by sea via the I

Canal, but there is also a good trade in supplying the treeless prairies with fencing and building material

Mining

The western mountains are very rich in minerals. Gold mining is the chief industry of the *Klondike* District in the Yukon, which is frozen up for more than half the year, and where one of the processes of obtaining the gold consists in thawing the frozen ground with great jets of steam. Further south both gold and copper are mined near *Rossland* in the Gold Range. There are valuable coalfields near the Crow's Nest Pass in the Rockies, and on the south east side of Vancouver Island near *Nanaimo*, while supplies of iron and other minerals are known to exist, although at present they are not extensively worked.

Salmon Fishing

This is a very important industry all along the coast as far north as Alaska. The fish come in from the sea and ascend the fiords and rivers in the spawning season, being trapped by nets stretched between poles as they return down stream in the summer. In this way they are caught in millions every year and a large industry has sprung up in connection with canning them for export. At the canneries the fish are cut up, cleaned, cooked, and sealed in tins, many Chinese coolies being engaged in this work. There are large canneries at *New Westminster* at the mouth of the Fraser River, and also at *Prince Rupert* on the Skeena estuary further north. The industry is also important in the adjoining parts of the United States, particularly Alaska in the north and the Columbia estuary to the south.

Fruit Growing

This industry is increasing in importance in all the southern valleys of British Columbia. The summers are

hot and dry, and bring all kinds of British and Mediterranean fruits to perfection. Water for irrigation is necessary but easily obtainable from streams descending from the glaciers on the high ranges which enclose the valleys. Much fruit is dried or tinned for export, and New Westminster, with its experience in canning salmon, has added fruit canning to its industries. The most

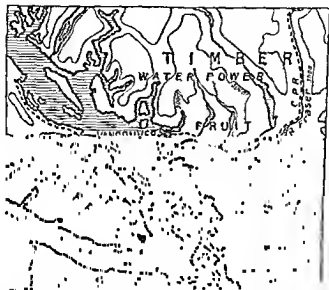


FIG. 35—Some factors in the growth of Vancouver and Victoria

famous fruit farms are those along the shores of the picturesque lakes in the valleys of the Okanagan and Kootenay tributaries of the Columbia River.

CITIES AND ROUTES

Vancouver, though not the capital, is the largest city of British Columbia and the fourth city in size of the Dominion. Although it shares the lumbering, mining, fishing and fruit-growing industries of the Fraser Valley

it is not actually situated on the river, which has a very swift current. Vancouver is on the fine, sheltered, never frozen deep water harbour of Burrard Inlet (Fig 35). The main line of the C P R., which follows the Fraser Valley for the last hundred miles of its course, has its terminus at Vancouver, which, as we have already seen, has become a great exporter of wheat from the western prairies, as well as of British Columbian produce. Canadian Pacific liners leave the port regularly for Japan, China, Australia, New Zealand and the chief Pacific ports of America. Sugar imported from the Pacific Islands is refined at Vancouver, and there are also many other manufacturing industries using coal from Vancouver Island for power. In the summer steamers leave with supplies for the Yukon goldfields. They go to Skagway in Alaska, from which a railway journey of a hundred miles takes them to the Lewes River, down which they are sent by steamer to *Dawson*, the centre of the rich Klondike goldfield. The last part of the route is worked by dog sledges in the winter time, mainly for the transport of mails.

Victoria, the capital of British Columbia, is beautifully situated on Vancouver Island. With a fine harbour and railways to the lumbering, coal-mining and fruit growing centres of the east coast of the island it has a thriving trade.

New Westminster, at the mouth of the Fraser, has shipbuilding yards as well as its canneries of fruit and salmon.

Prince Rupert is a rising town and seaport at the mouth of the Skeena River. It is the Pacific terminus of the Canadian National trans continental railway, which crosses the Rockies by the Yellowhead Pass, it has a good harbour and easily obtains coal supplies from the Queen Charlotte Islands.

QUESTIONS AND EXERCISES

- 1 Contrast British Columbia with Central Canada.
- 2 Compare the ancient and modern routes between Britain and British Columbia
- 3 Why is the corresponding region of South America not so well developed as British Columbia?
- 4 Describe the railway journey from Calgary to Vancouver
- 5 Compare the eastward and westward goods traffic of the railways crossing the Rockies in Canada
- 6 Write an account of the scenery climate and industries of Vancouver Island
- 7 Draw sketch maps illustrating reasons for the growth of Victoria and Prince Rupert
- 8 Describe the route from Vancouver to Dawson City
- 9 What time is it in Vancouver when it is noon (a) at Montreal, (b) at Greenwich?
- 10 Compare the gold mining of the Yukon with that of Western Australia, and of the Union of South Africa respectively. The production of gold in the Dominions in 1921 in millions of pounds value was, Union of South Africa 43 Australia 4 Canada 4
- 11 What are the relative advantages of Vancouver and Montreal as wheat ports?

CHAPTER XX

THE WATERWAYS AND RAILWAYS OF CANADA

We have learnt something of the vast size and magnificent resources of the Dominion, and it is obvious that these make very important the various means of communication that enable the produce of forests, mines and prairies to be interchanged or collected for export in return for other necessities of modern civilized life. The Red Indians, living on what the country produced, were satisfied also with the means of communication that nature provided in the magnificent lakes and rivers of Canada. On these, when they felt inclined, they made long journeys in their light birch bark canoes, which they could easily carry round waterfalls and other obstructions, or between the head waters of one river and another. In winter they glided over the ice and snow on their broad snow shoes.

The early settlements of the white men were by the coast or along the rivers, and they adopted very largely the transport methods of the Indians. But as the settlements grew, larger vessels were constructed, and canals were built to avoid the falls and rapids of the great St. Lawrence highway. Then when the great value of the prairies had been recognized, at a time when the railway had proved its value in Britain, it was seen that all that was needed to develop the wealth of the interior was the construction of railways so that people could be brought from the thickly peopled homelands to these almost uninhabited regions. Thus over large areas of Canada the first sort of road was the railroad, and alongside it soon sprang up the homesteads of farmers, who could purchase with the results of their labours on the rich

virgin soil many of the necessities of a comfortable existence. Railways have probably contributed more than any other single factor to the development of the Dominion; but the great waterways are still very important, and we will study them first.

THE GREAT LAKES ROUTE

We have learnt how at the end of the harvest vast stores of grain are brought by rail to the elevators at



FIG 36—The Great Lakes Routes of North America. (Figures on Lakes denote height in feet above sea level)

Fort William and Port Arthur, the twin ports on *Lake Superior*. The holds of the great "whale-back" lake steamers are filled with corn by pipes from the elevators, and they then proceed on their day's journey across the lake, where fogs and storms as bad as any at sea may be encountered. At *Sault Ste Marie* the falls are avoided by the locks of the "*Soo*" Canal, leading to *Lake Huron*. The importance of this route is shown by the fact that the annual tonnage of shipping passing through the *Soo Canal* is vastly in excess of that which passes through either the *Suez* or the *Panama Canal*. *Lake Huron* is

little smaller than Lake Superior, and the traffic upon it is greater, for it receives also the large amount of United States traffic from Lake Michigan. The route then proceeds without obstacle by the St. Clair River and Lake and the Detroit River to *Lake Erie*. Much traffic leaves the eastern end of this lake at Buffalo en route for New York, but the purely Canadian traffic traverses the *Welland Canal* to avoid Niagara Falls. This canal is now being widened and deepened so that large ocean liners may eventually reach Fort William and other of the Lake ports. The Rapids by which *Lake Ontario* empties into the St. Lawrence are avoided by the *St. Lawrence Canals* alongside the river. Pleasure steamers sometimes give their passengers the thrill of "shooting" these rapids, but they too use the canals going up stream. *The Lachine Canal*, cut through the island on which the city is built, enables steamers to avoid the Lachine Rapids, and reach their destination at *Montreal*. Small vessels may leave Lake Ontario at Kingston and proceed by the small Rideau Canal to Ottawa, and then follow the Ottawa River to Montreal. At this port the lake steamers transfer their cargoes to ocean liners from Britain and return up stream with manufactured goods that the ships have brought, or with coal and other goods from Eastern Canada and the United States. Much iron ore is also brought down by the lake steamers from the shores of Lake Superior to be smelted on the coal fields, and it should be remembered that a great trade in timber, wood pulp and paper passes along the lower St. Lawrence during the six or seven months that the river is not impeded with ice.

In spite of the fact that this route is only available for about half the year it is so valuable that it is being improved by the widening and deepening of existing canals and the construction of new ones. The most important proposal in this direction is to use the many lakes and streams to the east of Georgian Bay on Lake

Huron in order to make a short cut by canal to the Ottawa River, and thus reduce the journey from Fort William to Montreal by more than three hundred miles.

As the other waterways of Canada are frozen up for large parts of the year, or impeded by falls and rapids, and pass through very thinly peopled regions, they are not at present very important commercially, although their uses to the lumberer, fur trader and electrical engineer in many parts must not be overlooked. Many of the lakes and rivers are also ideal summer resorts for holiday makers and sportsmen.

RAILWAYS

The world famous *Canadian Pacific Railway* serves the three main purposes of railway construction in Canada, viz to connect up the widely separated eastern and western provinces of the Dominion, to enable the produce of mines, forests and prairies to reach the outside world, and to carry goods to the coast when the waterways are frozen. Some idea of the vastness of this undertaking may be gathered from the facts that its main line alone from St. John on the Atlantic to Vancouver on the Pacific is longer than all the lines of the Great Western Railway in Britain added together, that the express journey across the continent takes almost six days, and that to cross the Rockies it has to climb nearly a mile above sea level. It should be remembered too that this was undertaken at a time when Canada contained fewer than five million people.

Another way in which we may appreciate the great length of the C.P.R. is by noticing that when it is mid-day at St. John, the eastern terminus, it is only 8 a.m. at Vancouver, the western terminus, which is 60 degrees of longitude further west. Passengers crossing the continent would therefore find their watches four hours fast at the end of a journey westwards, or four hours slow if journeying eastward. To avoid this Canada is divided

into five *Time Zones*, called Atlantic, Eastern, Central, Mountain and Pacific respectively (Fig 37) All towns in any one of these zones keep the same time, which is just one hour ahead of its western and one behind its eastern neighbour Railway travellers put their watches back or forward by one hour as the case may be when they pass the frontier station of each zone These stations are usually in out of the way places, but Fort William is on the boundary between the Eastern and Central Zones

Trace out the C P R trans continental route on the map Notice that it leaves the winter port of *St John* in New Brunswick, crosses the well timbered highlands of Maine, U S A , and reaching Quebec Province crosses the St Lawrence by a fine bridge more than two miles long to *Montreal* where the C P R locomotives and rolling stock are made It then follows the wooded shores of the *Ottawa* River to the Dominion Capital and continues through the forests of Ontario to the copper- and nickel mining centre of *Sudbury* It reaches the shores of Lake Superior near *Fort William* and leaves the forests for the prairies just before reaching *Winnipeg*, the great railway junction and grain collecting centre of Manitoba It then goes on across the wheat fields of Saskatchewan to *Regina* and through the cattle ranches of Alberta to *Calgary* For two whole days the train has been crossing the treeless grass lands, which in early summer are green and bright with flowers, but later on are brown with corn and hay Scattered farms and homesteads a wayside station with tall grain elevators, a herd of cattle or a small Indian encampment, are the only breaks in a rather monotonous landscape But after *Calgary* is passed the line follows the Bow River valley into the magnificent scenery of the Rocky Mountains where rugged and snow peaks rise out of dark forests and in the great National Park at *Banff* glimpses may be obtained of such wild animals as the bison, the

caribou and the grizzly bear, which are there preserved from destruction

The line climbs and zigzags and finally tunnels under

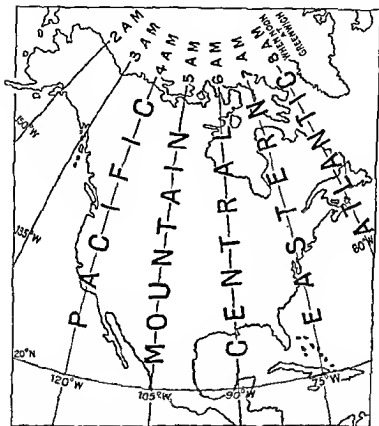


FIG 37—Standard Time Zones of North America and the Longitudes on which their times are based

the *Hitching Horse Pass* to emerge in the forested gorges of the Columbia River. Tunneling through the magnificent Selkirk Range it again reaches the Columbia, which has made a great bend round the mountains, and after

crossing the Gold Range the forested valley of the Fraser is reached. The winding gorge of this river is followed almost to the sea and magnificent views can be obtained from the open observation car at the back of the train. Leaving the Fraser the line follows the picturesque shores of Burrard Inlet to *Vancouver*, the great and rapidly growing seaport of British Columbia.

Notice the important branch lines of the C P R (1) from *Montreal* through *Toronto* and other cities of the fertile Lake Peninsula, entering the United States at *Detroit*, (2) from *Sudbury* through iron mining districts to *Sault Ste Marie*, (3) from *Winnipeg* to *Edmonton* and thence to *Calgary*, (4) from *Medicine Hat* to the *Crow's Nest Pass*, the coal and gold mining regions and fruit farms of British Columbia.

The *Canadian National Railway* System controlled by the Dominion Government, serves other parts of Canada. A second trans continental route goes from *Halifax* by *Moncton*, *Quebec*, *Winnipeg*, *Edmonton*, and the *Yellowhead Pass* to *Prince Rupert* on the Pacific. An important branch is to be constructed from this in the Saskatchewan Nelson Valley to Hudson Bay, thus affording in summer the shortest route between the Canadian prairies and western Europe. A train ferry across Northumberland Strait links up the railways of Nova Scotia with those of Prince Edward Island.

QUESTIONS AND EXERCISES

1 Describe a journey on a lake steamer from Montreal to Fort William

2 Draw a sketch map to illustrate your answer to Question 1. Indicate the position of the chief ports and canals and the productions of the surrounding regions.

3 a C.P.R. Time Table, covering the route across Canada from

Station	Distance from Montreal in miles.	Time		Height above Sea level in feet
		Arrival	Departure	
Montreal, Q	—	Monday	10 15 p.m.	110
Ottawa, O	111	1 20 a.m.	1 40 a.m., Tu	214
Sudbury, O	439	12 50 p.m.	12 55 p.m., Tu	857
Fort William, O	992	9 55 a.m.	9 15 a.m. W	617
Kenora, O	1,239	5 45 p.m.	5 55 p.m. W	1,091
Winnipeg, M	1,412	9 45 p.m.	11 0 p.m., W	772
Broadview, S	1,676	7 20 a.m.	6 30 a.m. Th	1,968
Regina, S	1,769	9 50 a.m.	10 10 a.m., Th	1,896
Calgary, A	2 244	4 45 a.m.	5 15 a.m., F	3 439
Lake Louise, A	2 361	10 35 a.m.	10 25 a.m., F	5 044
Field, B.C.	2 381	11 35 a.m.	10 30 a.m. F	4 072
Donald, B.C.	2,432	12 57 p.m.	12 57 p.m., F	2 579
Glacier, B.C.	2 466	2 50 p.m.	2 50 p.m. F	3 778
Revelstoke, B.C.	2 506	4 30 p.m.	4 45 p.m. F	1,494
Fraser, R., B.C.	2 735	2 40 a.m.	2 40 a.m., S	520
Vancouver, B.C.	2 886	9 0 a.m.	Saturday	14

(a) From the above data and the map in your atlas construct a rough profile of the route across Canada from Montreal to Vancouver. Indicate the principal physical features shown by the profile.

(c) How long does the whole journey take? What is the average speed maintained? In which section of the route is this speed exceeded?

4 Compare the actual routes by which grain is sent from Saskatchewan to Britain, with the proposed route via Hudson Bay. Work out their relative distances with string and globe.

CHAPTER XXI

NEWFOUNDLAND

PHYSICAL FEATURES AND CLIMATE

This island a little larger than Ireland, but with only about a quarter of a million people, is a self governing Dominion of the British Empire and also controls the coastal strip of Labrador. Its ridges and valleys, much weathered by ice action, resemble those of the Eastern Highlands of the mainland of which it is simply a detached portion. Its coast is rugged and indented with many fine fiords. Away to the south east stretches the "continental shelf," a vast submarine platform about as large as the island and only covered by the sea to a depth of thirty or forty fathoms. This constitutes the *Grand Banks* of Newfoundland, the richest fishing ground in the world. It is due partly to the submergence of a wide coastal plain, and partly to the deposition of rock waste scraped by glaciers from the surface of Greenland and Labrador and brought down by icebergs in the Labrador Current during the summer months. The same Current probably brings down from Arctic regions minute organisms which feed the swarms of cod and other fish that live in the shallow sea over the Grand Banks (Fig. 39).

The causes of the cold winters, heavy rainfall, and frequent fogs especially near the coast, which are characteristic of the climate of Newfoundland have already been referred to (Chap. XIII). The summer climate, however, is quite pleasant.

Like the neighbouring parts of Canada most of the island is well timbered and the old rocks contain much mineral wealth, but the fisheries which attracted the

first settlers are still the greatest source of wealth in the country, and the timber and minerals are only recently being exploited, the former especially for wood pulp and paper. The climate does not greatly favour agriculture, and hay, potatoes and other vegetables are the chief crops. Bell Island, in Concepcion Bay, has very valuable iron deposits, most of the ore being exported to Sydney in Cape Breton Island for smelting.



FIG. 38.—The Newfoundland Fishing Grounds. Note the importance of shallow Seas and the Cold Labrador Current.

THE FISHERIES

No country is dependent to so large an extent upon fishing as is Newfoundland, a quarter of the whole population being actually engaged either in catching fish or in preparing it for export. The fishing on the Grand Banks is shared by fishermen from Canada and the United States and even from western Europe; but most

of the Newfoundland fishing is of the inshore type, that is within a few miles of the coast of the island or of Labrador. Many temporary settlements of fishermen are made on the fiords of Labrador in the summer months for landing, cleaning and drying the huge catches of cod and other fish. The cod are caught on long lines, each of which may hold more than a thousand baited hooks and need hauling with a windlass. The fish, after cleaning, are salted and hung out on wooden stages to dry in the sun before being packed in barrels for export, mainly to the Roman Catholic countries of the Mediterranean and of South America. Over half of the total exports of Newfoundland consist of dried codfish! Herrings, lobsters and salmon are also caught in large quantities and canned for export. Cod liver oil is a valuable by-product of the fisheries.

The *seal fisheries* of Newfoundland are also interesting. The seals with their young congregate in winter on the frozen sea ice in Baffin Bay. With the coming of summer the ice breaks up into flat "floes," some of which may be several square miles in area, and come floating down in the current past the coast of Labrador. The sealers run their boats alongside a floe, land upon it, club as many seals as they can and return to their boats with the sealskins and blubber or fat. These skins are not furry but make good leather, and from the blubber is made seal oil, the chief source of light and heat for the Eskimo in winter. As may be imagined, sealing is risky work, needing strong ships and fearless men.

St John's, the capital, quite a small town, has a fine harbour and is the chief fishing port. In return for its fish products, wood pulp, paper, and the iron ore of Bell Island, it imports textiles, flour, metal goods and coal, mainly from Canada, the United States and Great Britain. A narrow gauge railway traverses the island from St John's to Cape Ray, linking up fishing villages on the coast and the wood pulp centres at the falls on the rivers.

The trans-Atlantic cable from Valentia Island, off the south-west coast of Ireland, comes ashore in Trinity Bay, crosses the narrow isthmus and leaves for Canada and the United States.

QUESTIONS AND EXERCISES

1. Compare and contrast Newfoundland with Great Britain in physical features, climate and productions

2. Why did Newfoundland not become part of the Dominion of Canada ?

3. Describe and explain the dangers to shipping approaching the Gulf of St. Lawrence from the Atlantic. When is the approach most dangerous ?

4. What advantages has Newfoundland for the establishment of the wood-pulp industry ?

5. Newfoundland's exports in 1921 and their value in millions of dollars were: dried cod, 13, other fishery products, 2, wood pulp and paper, 5; iron ore, 1. Total, 23. These were exported to: United Kingdom, 8, Portugal, 3, Spain, 3, Italy, 2, U.S.A., 2; Brazil, 2; Canada, 1, others, 5. Represent these figures diagrammatically and comment upon them.

CHAPTER XXII

THE UNITED STATES OF AMERICA INTRODUCTORY

This Republic is the greatest in the world, in area, in population and in productivity. We have read something of its early history and we will now learn something of the great natural advantages with which it is blessed and of which its people are making such good use. We may well feel proud that the achievements of early British settlers and their descendants have made this Republic greater than any of the Republics of Central and South America that were settled by other peoples, but we should remember that its natural advantages were far greater. This, too, is of course the main reason why Canada, although larger than the States, is still much more thinly peopled and much less fully developed.

The United States, only slightly smaller than Europe, have, with the exception of the highest mountains, very little waste land indeed. They have the greatest supplies of coal, iron, petroleum and copper in the world. They have vast fertile plains, with climate and crops ranging from cool temperate to sub tropical, and where it is neither too cold nor too hot to make life or work difficult throughout the year.

To this land settlers were welcomed, until recent years, from all countries of Europe, so that the population grew from 10 million to over 100 million in a century. And although the United States now find it necessary to limit the number of immigrants, several hundred thousand still enter the country every year. At the last census, in 1920, it was found that of the 100 million people in the States about one-eighth had been born in various European countries, the largest numbers being British, Germans, Italians, Russians and Poles. Thus,

although the official and most commonly spoken language is English, many newspapers are published in foreign languages. So many of the people, or their ancestors, have fled from religious or political persecution in their native lands that Liberty is the watchword of the States, and it is symbolized by the huge Statue of Liberty on an island in New York Harbour.

Although there are as great individual differences of wealth and poverty in the United States as in any country, every citizen has equal rights, and class distinctions are not so marked among the people as in the countries of the Old World. Each State is intensely proud of itself and its achievements but more proud of the country as a whole, and all are linked together by wonderful systems of railways, education, newspaper and postal services into a united nation whose influence in the world is very great indeed.

In studying the geography of the United States it should always be remembered that we are considering a country thirty times the size of the British Isles, and although for convenience in an elementary study we may divide it into a few regions, each of these could easily be subdivided into many others differing as much from each other as do the different regions of our own country which we have already studied.

QUESTIONS AND EXERCISES

1 Draw three rectangles on the same scale to represent the areas of the British Isles, the United States and Canada respectively.

Canada

3 730 000

9

2 Of the 100 million people of the United States only 81 million were white people born in the States. 13 million were born in Europe. 10 million were negroes and sent these facts by a diagram of States in latitude 40° N. Central Plains and the Eastern

CHAPTER XXIII

WESTERN U S A

Taking this region as that which lies between the Rockies and the Pacific it will be seen that it is mainly a highland region with great mountain ranges and plateaus and a few large river valleys. Although it covers about a third of the United States, it has only about a twelfth of the total population. Its minerals are its chief source of wealth, although, like the adjoining region of Canada, it has also lumbering, fruit growing and fishing industries.

THE ROCKY MOUNTAINS

These have already been described in earlier chapters. Mention may be made of the Yellowstone National Park in the State of Wyoming, where an area almost as large as Yorkshire has been preserved for the benefit of the public. It contains high peaks, deep gorges, rushing streams, waterfalls and geysers which throw tall fountains of boiling water into the air at intervals. Rock layers of varied colours, fine trees and herds of wild animals protected from the sportsman's gun are other features which make this Park a world famous holiday resort.

The mineral wealth of this region is very great, coal being mined in all the States bordering the Range and great supplies of gold, silver, lead and copper being obtained in the region near Pike's Peak, in Colorado. The States of Idaho and Montana are also rich in copper and lead.

Denver, at the foot of the Rockies, is the great market town of the Colorado mining districts. It is also an important railway and cattle ranching centre.

THE PLATEAUS

These suffer from *great drought* and from considerable extremes of temperature. The few rivers that cross them, notably the Snake in the north and the Colorado in the south, have excavated deep gorges or canyons which although weird and picturesque are of little value (Fig 39). The central basin in Utah is drained to the Great Salt Lake which at one time covered a much larger area than at present, much of the surrounding country being covered with an incrustation of salt.

This region supplies about a third of the gold, silver

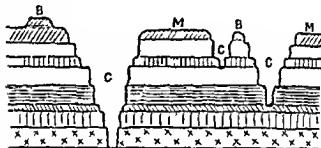


FIG 39—Formation of mesas (M) and buttes (B) by the erosion of canyons (C) in a plateau with horizontal strata (see p 73). Vertical scale much exaggerated in proportion to horizontal.

and copper of the States. Cereals, fodder crops and sugar beet are cultivated under irrigation along some of the rivers on the plateau.

Salt Lake City is the only city of considerable size in this region, and it owes its rise to the industry of the Mormons, a religious sect who, exiled from other parts of the States, irrigated and made fruitful a portion of this desert region, and built a magnificent city as the centre of their activities. The Union Pacific Railway, the great trans continental line from New York to San Francisco is now carried across the Salt Lake on a huge wooden viaduct which shortens the journey by forty

four miles *Ogden* is another mining and railway centre near the shore of the Lake at the eastern end of this "cut off," as it is called

THE PACIFIC COAST REGION

In the north, around Puget Sound, and the lower valley of the Columbia River are very fertile plains and richly timbered slopes very similar to those of British Columbia. In Washington State there are also supplies of coal, and the Columbia is one of the salmon rivers although careless fishing has diminished the value of this product.

Seattle and *Tacoma*, in Washington, and *Portland* in Oregon have become important towns and seaports dealing with the preparation and export of timber, wheat, tinned fruit and salmon.

The Californian Valley, further south, is one of the most fertile spots in North America. This valley is enclosed between the Sierra Nevada and the coast ranges and is covered with fertile soil brought down from the mountains (Fig. 40). The Sacramento River from the north and San Joaquin from the south supply abundant water for irrigation, and the winter rains and intense summer heat allow of the growth of rich crops of wheat and barley and of all the typical Mediterranean fruits. Dried grapes (raisins) and plums (prunes), tinned pears, apricots and peaches, oranges and lemons are exported in large quantities.

On the coastal ranges, where rainfall is heavier and temperatures are lower, largely on account of fogs, fine timber is grown, including the famous "big trees" of California. This state has also great mineral wealth, the gold supplies from the Sierra Nevada still being important although the output since the sensational rush of gold seekers in 1847 has been enormous. The most valuable mineral of California to day is petroleum obtained from the rich oil wells in the southern part of the San

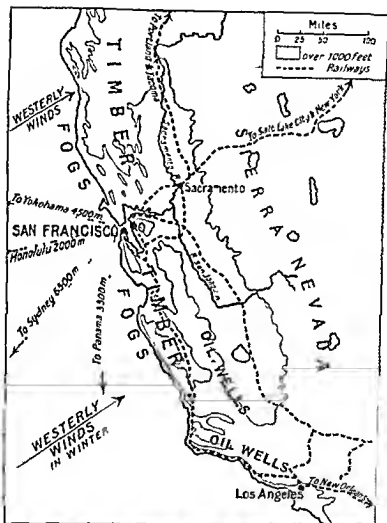


FIG. 40 — The fertile Californian Valley and some other factors that have led to the importance of this region

Joaquin Valley which supply about a third of the total output of the United States

Petroleum is a natural oil distilled from layers of decayed vegetation, similar to coal, by the interior heat of the earth. The oil flows into hollows in the rock layers forming vast underground "pools" or lakes (Fig 41). By boring through the overlying rock layers these pools can be tapped. There is often sufficient pressure of gas above the oil to force the liquid to the surface and it is sometimes difficult to control a "gusher" of this type. In other cases the oil is pumped up in a similar way to pumping water from a well. In some places the supplies of "natural gas," which is similar to coal gas before it has been purified, are very large indeed and can be led off in pipes and stored in gasometers ready for use as fuel to drive machinery. The oil is either stored in tanks or led through "pipe lines," which may extend for a hundred miles or more, to the nearest seaport where it is poured into the holds of ships known as "oil-tankers" for export. From the crude oil as it comes from the ground various valuable products are refined by distillation, the chief being paraffin, petrol, benzine, vaseline, and paraffin wax.

San Francisco is the great gateway of the rich Californian Valley, and the entrance to the fine harbour through the natural break in the Coast Range is called the Golden Gate. As the outlet for the many products of its rich hinterland, as a good harbour on a coast where harbours are few and as the terminus of several great trans continental railways, it has become a city of world importance. The construction of the Panama Canal has brought it much nearer to the Atlantic ports of the U.S.A. and of Europe and largely increased its trade. It has unfortunately suffered much from earthquakes, that of 1906 doing much damage, but its position is so good that its people have risked rebuilding it at enormous cost, and its population exceeds half a million. Its

manufacturing industries include flour milling, fruit preserving and shipbuilding, and it has many thriving suburbs across the bay. Liners leave San Francisco regularly for the ports of Western Canada, Peru and Chile, the Pacific Islands, China, Japan, Australia and New Zealand, and also for Atlantic ports via the Panama Canal.

Los Angeles has grown to be an even greater city

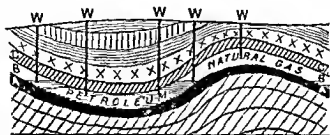


FIG 41 —Diagrammatic Section of part of an Oilfield showing —

A. Rocks containing matter from which oil and gas have been derived

B. Porous rock whose pores hold the oil and the gas

C. Non porous rock layer which prevents escape of the oil and the gas

W The wells from which petroleum and natural gas are obtained

in population than San Francisco, mainly owing to the establishment of the chief centre of the great American cinema film industry in its vicinity. For this its clear air, bright sunshine and fine scenery were especially suitable. It is also near the valuable oilfields of the state, and considerable areas behind it now produce rich crops under irrigation.

Sacramento, an agricultural centre in the middle of the valley, is the capital of California.

QUESTIONS AND EXERCISES

1 Describe the scenery of the railway route from Denver to San Francisco

2 California has an average population of 22 people to each square mile while the adjoining state of Nevada has less than one. Account for this difference

3 Describe the Grand Canyon of the Colorado River and explain its formation

4 Why does this region suffer from earthquakes especially in the coastal areas ?

5 What produce from California enters Britain in considerable quantities ? From what parts of the British Empire could similar produce be obtained ? Why ?

6 What is the time at San Francisco when it is noon in London ?

CHAPTER XXIV

THE CENTRAL AND SOUTHERN STATES OF THE U S A

This vast region, comprising the basins of the Mississippi and its great tributaries and the adjoining coastal plains, is very important indeed. The main interests of its people are in various sorts of farming, although as we shall see, it contains valuable mineral deposits and many thriving manufacturing towns. We have already learnt that in this region rainfall decreases and range of temperature increases with distance from the Gulf of Mexico, leading to great differences in the types of crops which can be grown. Thus if we journeyed up the Mississippi we should first pass through a narrow belt of wet lowlands where rice and sugar cane are the principal crops. Then would come the broad belt of cotton lands which produce over two thirds of all the world's crop. This gradually passes into a cooler belt of country where maize and tobacco are more important crops, while further north we come to the great wheat growing lands which join those of the Canadian prairies. The high grassy plains to the west of these fertile lowlands, as in Canada, are great cattle and sheep ranching areas, while around the shores of the Great Lakes timber is an important product.

It will be readily understood how important is the great navigable waterway which links together all these regions, enabling them to interchange or export their varied products. Let us consider some of these regions in greater detail.

THE WHEAT BELT

Wheat is the most important, but of course not the only, crop in the States of Minnesota and the Dakotas, which have within them part of the Red River Valley,

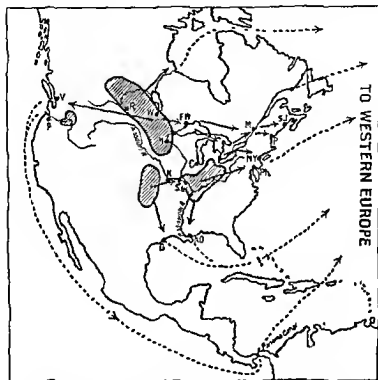


FIG. 42.—The Wheat Lands of N. America, showing chief growing areas (shaded), markets, seaports, and routes for export of surplus grain to Western Europe

of whose great fertility we have already learnt. These states have the same advantages of soil, climate and level land as the Canadian wheat-lands which they resemble in their large-scale methods of farming and marketing the produce (Fig. 12)

Minneapolis grew up at the Falls of St Anthony which set a limit to the navigation of the Mississippi and supplied power for the flour mills. This power is now supplemented by coal brought by rail from the coalfields to the south and east and the city has become the greatest flour milling centre in the whole world.

Duluth, on Lake Superior, and *Milwaukee*, on Lake Michigan, are great grain ports and the latter is also a big milling centre.

THE MAIZE BELT

Maize, a plant with much larger leaves and stem and producing a 'cob' which is much heavier than an ear of wheat, requires more rain and much warmer summers to ripen it. It is therefore cultivated further south. Iowa, Illinois and Indiana are the central States of the maize belt but its cultivation spreads into the surrounding states where climate and soil are suitable. Maize is sometimes called Indian corn because it was the chief grain crop of the natives but it is more generally known in the United States simply as corn to distinguish it from wheat and other cereals. The area under corn and the number of bushels produced greatly exceed those for wheat. The ripened maize is ground into cornflour and prepared in various ways for the breakfast tables of the States and for export to Britain and other countries. The green corn cobs cooked in milk are also a favourite vegetable. But *corn* is used for the fattening of animals sent from the poorer grass lands to the slaughterhouses of the great cities of the central and eastern states.

Within the maize belt, however, lie some of the greatest coalfields (Fig 43) so that many of the cities which were only a few years ago market towns and meat packing centres have now become great manufacturing cities with engineering works of all kinds.

Chicago is not only the greatest city of this region but it is the second city in the whole country, having nearly three million people, although a century ago it had only as many thousands. It began as a fur trading centre the mouth of the little Chicago river where it enters Lake Michigan making a good harbour (Fig 44). Behind it too, lay an easy natural route to the Illinois tributary of the Mississippi, in early days used as an

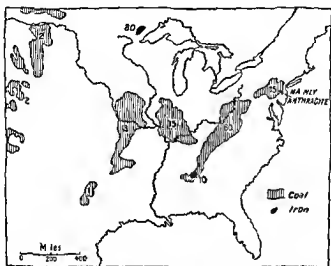


FIG 43 —Principal Coalfields and Ironfields of the U.S.A. Figures denote approximate percentage of total output. Note the importance of the Great Lakes as the link between the chief iron and coal producing areas of the country

Indian "portage" between the two great waterways and now followed by railway and canal. With the opening up of the prairies, routes came to this central point from all parts, bringing wheat and maize and meat to be sent eastward by the Lake Routes or by rail. It has thus become the greatest railway centre in North America. The railways and lakes also enabled it to collect coal, iron, timber and other raw materials so that

now, apart from its huge flour mills, cattle slaughtering and meat packing industries for which it is world famous, it has enormous factories turning out railway material, motor cars, agricultural and other machinery on the largest possible scale. To keep pace with its increasing trade its harbour has been improved and enlarged, and

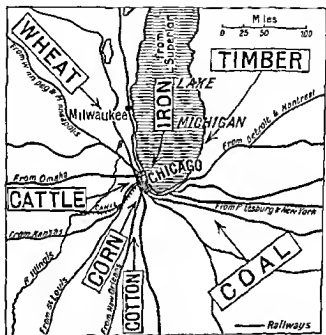


FIG 44—Chicago, the great Lake Port Railway Junction and Manufacturing City of the Central Plains

if, as is contemplated, the Erie Canal and the Illinois Canal are so improved as to make it possible for ocean steamers to reach it from the Atlantic and the Gulf it may well become in time the greatest city in the United States

St. Louis grew at a point naturally marked out for a big city, at the junction of the great Mississippi with

its biggest tributary and at the lowest point on the river that could be bridged in early days. With large coal-fields to east and west, supplies of iron, lead and zinc in the old rocks of the Ozark Plateau to the southwest, added to the great fertility of the surrounding plains producing maize and wheat, St. Louis has become a railway and manufacturing centre second only to Chicago.

Louisville and *Cincinnati* on the Ohio River are two other great centres with manufacturing as well as agricultural interests. They lie in a region where tobacco is largely cultivated and therefore are concerned in the drying and preparation of the leaf for export.

Kansas and *Omaha*, nearer the cattle ranches, have become great meat packing centres. Their importance is increased by the great trans continental railways which cross the Missouri at these points.

THE COTTON BELT AND THE OILFIELDS

In the broad belt of country extending from Texas to North Carolina (Fig. 45) about half the area which grows anything is cultivated for cotton mainly by negro labourers working for white masters. The cotton seeds are planted in spring, as soon as frosts have become unlikely, as the young plants are very sensitive to frost. The plant needs careful attention throughout the summer, during which it grows into a bush about three feet high which produces yellow or red flowers. When the flowers die off they leave a "boll" or seed pod containing several greyish seeds about as large as cherry stones, surrounded by a mass of white fluffy fibres which is the valuable cotton. When the seeds are ripe the cotton wool bursts out from the dry boll. The lower bolls ripen first and the labour of picking which can only be done by hand, is often spread over a month or two. The picked bolls are taken to a ginnery where the gins, which are revolving toothed wheels, separate the cotton fibres from the seeds. The cotton is compressed and packed by machin-

ery into bales or bundles weighing about five hundred weights each which are then sent by rail or river steamer to a cotton manufacturing town or a seaport. Most of the seeds are sent to oil mills where presses squeeze from them an oil which is valuable for fine lubrication for making salad oil and margarine and for many other purposes. The refuse of the cotton seed makes valuable cattle cake for fattening animals or is used as manure on the cotton plantations thus returning to the soil

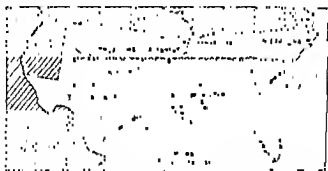


FIG 45—The Cotton Belt of the U S A showing chief states in which the plant is cultivated climatic factors which favour production and the chief ports exporting cotton

some of the valuable plant food of which it has been robbed by the cotton plant

The greatest enemies of the cotton plant are frost and the boll weevil. The former may kill off young plants in spring or shrivel up the bolls in autumn before they are ripe for harvest. The boll weevil is a small beetle which eats the fibres in the pods. This pest has spread rapidly from Mexico into the United States in recent years sometimes ruining as much as a third of the crop. As the United States produce the greater part of the world's crop of cotton it is not only the cotton farmer who suffers from the ravages of the boll weevil

The cotton plant needs hot summers to ripen the bolls and sufficient but not excessive rainfall. If the rainfall is less than about twenty inches a year irrigation is necessary. The value of cotton mainly depends upon its staple or length of fibre. Sea-island cotton, so called from being grown originally on the islands off the coast of Georgia, is a fine, silky, long-stapled variety, its fibres averaging nearly two inches in length. This is the most valuable American variety, although much greater quantities of the shorter stapled Upland variety are grown.

Nearly half of the cotton grown in the States is spun and woven there, the factories being situated where power is easily available for driving machinery and climate is sufficiently damp. In the States of the east coast along the Fall Line the rivers coming from the Appalachian Highlands in falls and rapids supply power, but on the west of the highlands in the cotton belt itself is a rich coalfield where the textile industry is becoming important, especially in the States of Alabama and Tennessee.

In Oklahoma State in the north-west of the Cotton Belt lies the richest oilfield in the United States, at present producing over a hundred million barrels of petroleum every year. There are other valuable oilfields in Texas and Louisiana, and the crude oil from all these regions goes by iron pipe lines to the Gulf of Mexico from which most of it is sent by tank steamers to the great cities of the north east, or exported to Western Europe for use as oil fuel on liners or to be refined into motor spirit and other products.

New Orleans, a city the size of Bristol, is the largest town and seaport of this region. It collects not only bales of cotton for export but wheat, maize and tobacco brought down the mighty Mississippi in the flat-bottomed stern-wheel steamers that negotiate the shallows of the river. Railways converge upon it from east, west and north and the distributary of the river leading from it

through the delta to the Gulf of Mexico is kept dredged to allow large ocean liners to use it. Founded by the French, the city still has a large French speaking population.

Gaheston, Mobile, Charleston and Savannah are important cotton ports, while the first exports oil and the second coal from the rich mineral fields that lie behind them.

Atlanta, in Georgia, is the largest inland city of the cotton belt. It is a great railway junction near the southern end of the Appalachians, and having access to water-power and coal has developed a large cotton manufacturing industry. *Birmingham*, in the rich coal and iron district of Alabama, has developed industries like those of its namesake in Britain, and also manufactures cotton goods.

Memphis, in Tennessee, is an important railway junction and river port, collecting cotton and timber to send down to New Orleans for export.

THE CATTLE BELT

This consists of the high plains that extend from Montana to Texas at the foot of the Rocky Mountains. Rainfall is scanty and only sufficient for poor grass, but owing to the vast areas available great herds of cattle are able to eke out an existence where once the bison roamed. As in Canada the winter snowfall is not sufficient to be a drawback, and in the northern portion of the plains the warm chinook winds descending from the Rockies are a distinct advantage. Where however, the rocks are very porous the scanty rainfall does not suffice and the "Bad Lands" of South Dakota and the "Staked Plains" of New Mexico and Texas are practically deserts. The latter were staked by the early pioneers to show tracks along which water might be found by those travelling to and from the mining districts in the Rockies. There are no towns of any size in this region, even along the great trans continental railways which convey train-

loads of animals eastward to be fattened and killed in the great cities of the Muzzle Belt

FLORIDA

This state is a very low plain with hot summers, mild winters, and abundant rainfall. Much of the land is swampy and covered with tropical vegetation especially the Everglades region of the south. But the state is well timbered and has a lumber trade as the felled timber is easily exported. It is also famous for the growth and export of oranges, pineapples and other fruits, and it grows fresh vegetables in the winter time for the markets of the great northern cities. Its delightful winter climate makes *Palm Beach*, on the east coast, a famous resort for wealthy people from the northern states. Off the coast, in the warm, clear, shallow salt water, lie many coral islands or "keys" as they are there called.

Key West is a naval station of the U.S.A. and it is connected with Florida by a railway viaduct which runs for over a hundred miles from key to key, one stretch being across seven miles of open water. Key West also imports and prepares tobacco from Havana in Cuba.

Warm water blown towards the Gulf of Mexico by the North-east Trade Winds emerges through the Florida Strait as a warm ocean current flowing northward at a speed of about four knots and several degrees warmer than the Atlantic waters on either side of it. This current is sometimes called the *Gulf Stream*. It flows up past the Bermudas, but further north its waters become so spread out that it is no longer a true current but merges in the broad *North Atlantic Drift* of warm surface water which is carried towards Britain and Western Europe by the prevailing westerly winds.

Jacksonville the capital and *Tampa* are the chief ports of Florida. Besides timber and fruits these have a large export of phosphate, a rock substance used as a fertilizer on lands that have been heavily cropped for a long time, such as the cotton plantations.

QUESTIONS AND EXERCISES

1 What are the advantages of the Mississippi as compared with the St. Lawrence?

2 What are the drawbacks to the navigation of the Mississippi?

3 Give an account of a voyage down the Mississippi from Minneapolis to New Orleans, mentioning the chief cities passed and the type of cargo that might be taken aboard at each.

4 What region of South America is similar to the Mississippi Basin? In what ways? How does it differ?

5 Compare the temperature and rainfall of Minneapolis with those of New Orleans, using the following monthly means for the two places. Explain the differences observed.

Minneapolis. 12° F., 15, 23, 46, 53, 67, 72, 70, 60, 43, 31, 19

New Orleans. 53° F., 56, 62, 68, 74, 80, 81, 81, 78, 70, 61, 54

Minneapolis. 1 in., 1, 2, 2, 4, 4, 3, 4, 3, 2, 1, 1

New Orleans. 5 in., 5, 5, 5, 4, 6, 7, 6, 5, 3, 4, 5

Why is the former place unsuitable for cotton and the latter for wheat?

6 What limits the extension of the Cotton Belt (a) northwards, (b) westwards?

7 Where in the British Empire are the regions similar in climate to the Cotton Belt of the U.S.A.? In which of them is cotton being grown?

8 In 1922 the number of acres in the U.S.A. planted with each of the chief crops were, corn, 102 million, wheat, 61 million, cotton, 34 million. Represent these diagrammatically.

9 Give an account of the oilfields of the United States.

CHAPTER XXV

NORTH EASTERN U S A

Taking this region to include all the United States lying north of Carolina and east of Indiana, it is much smaller than either of the regions we have previously considered, but it contains considerably more than a third of the population of the whole Republic. Its great density of population relative to the rest of the country is mainly due to its great mineral wealth in coal, iron and oil and the vast manufacturing industries dependent upon them. It is also in the best position for interchanging the products of the United States with those of Britain and Western Europe and this commerce has been facilitated by an abundance of good harbours. We have already spoken of the industry and enterprise of the people who have turned all these natural advantages to such good account.

This region may conveniently be subdivided into three: (1) the New England States to the north east of the Hudson Valley, (2) The Hudson-Mohawk Gap, and (3) Pennsylvania and its neighbouring States.

THE NEW ENGLAND STATES

These include some of the earliest settlements made by the Pilgrim Fathers in North America, Massachusetts being founded in 1620, followed in a few years by New Hampshire, Connecticut and Rhode Island. These States also took a leading part in the War of Independence.

The map shows that the region consists of a fairly broad coastal plain along the Atlantic, the broad valley of the Connecticut River and the parallel ridges of the White Mountains and Green Mountains all running

approximately north and south. As we have already learnt this region was much worn down in the Great Ice Age, which has left the lowlands covered with a fertile boulder clay, while the higher valleys contain many picturesque moraine dammed lakes and rivers whose waterfalls are very useful as sources of power. The region has also sunk, drowning many of the lower valleys and forming good deep water harbours, while the relatively shallow seas over the submerged portions of the coast plains make valuable fishing grounds. The highlands of this region are poor in minerals but owing to receiving abundant rainfall are very well timbered indeed.

Thus the early colonists cleared the forests, laid out farms and developed the fisheries in much the same way as was done in the adjoining provinces of Canada. With the wool of their sheep they made their own clothing and tanning the hides of their cattle with the bark of the hemlock spruce they made leather for boots and shoes and saddles. As textile machinery was introduced from the mother country and worked by the simple power of running water before the steam engine was applied to driving it, and before the vast coal resources of the States were known this area rapidly grew to be the chief manufacturing area of the country. When the fertile prairies of the interior became opened up to large scale farming New England devoted itself more and more to the manufacturing side of industry. Later by importing coal and raw materials and using its water power to develop electricity it has kept ahead of modern developments and become one of the chief areas of the States for manufacturing cotton and woollen goods, leather, wood pulp and paper, clocks and watches. The fertile soil still enables New England to produce good crops of fruit and vegetables and Vermont especially provides much dairy produce for the large manufacturing centres of this and the adjoining region to the south.

Boston, the capital of Massachusetts, is the largest town and seaport of New England having three quarters of a million people. It is for the United States, a historic city and is beautifully laid out. In Cambridge, one of its suburbs, is Harvard the oldest University in America. The city grew up as the chief market town of the fertile coast plain and its good harbour has enabled it to develop its commerce. To place it more closely in touch with the Central Plains great tunnels have been constructed through the parallel ridges behind it and these bring it corn and meat and coal to feed its people and its industries and to add to its overseas trade.

Fall River, with water power and a good harbour, and *Lowell* at falls on the Merrimac River, are well known textile centres of Massachusetts.

Providence, at the head of Narragansett Bay, is the capital of Rhode Island, the smallest but most densely peopled State with great textile industries now using mainly imported coal, wool and cotton.

New Haven, on the coast, and *Hartford*, on the river, are the largest towns and textile manufacturing centres of Connecticut State. Yale, the second University of the States, is at New Haven.

The towns in the States of Maine, New Hampshire and Vermont are smaller, as in these States lumbering and farming interests are more important than manufacturing. *Portland*, a timber port of Maine, receives some of the winter trade of Montreal to which it is the nearest ice-free port.

THE HUDSON-MOHAWK GAP

The carving of this gap by the overflow of waters from the Great Lakes when the St. Lawrence outlet was covered by the great Ice Sheet has already been spoken of (p. 80). Attention has been called to its usefulness as an easy route across the Appalachian barrier between the Atlantic and the Central Plains. Its importance is

shown by the fact that at its mouth has grown up New York the largest city of the New World, and that along its course are half a dozen other cities, each with more than a hundred thousand people

The fertility of the valley is shown by the fact that

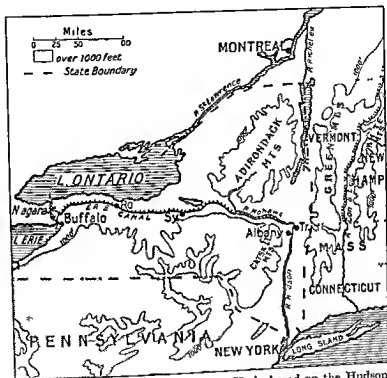


FIG 46 —The State and City of New York based on the Hudson and Mohawk Routes

it supported some of the strongest tribes of Indians—the Mohawks or Molucans—who offered a very stout resistance to the new comers in early days. At the present time it is a valuable mixed farming district. The bordering mountain ranges are rich in iron ore, building stones and other minerals. But owing to the

ease of communication with the interior by road, rail and canal through the gap the main interests of this region are in manufactures and commerce. It may be noted that New York State which practically consists of the Hudson and Mohawk valleys with their bordering highlands (Fig. 46), has over ten million people or about a tenth of the total population of the Republic.

New York City began as the Dutch settlement of New Amsterdam, on Manhattan Island at the mouth of the Hudson River (Fig. 47), and only became English in 1664 when its name was changed to New York. So long as the Indians occupied the Hudson Mohawk Valley and the interior was unexplored this small island settlement was much less important than Boston and other settlements on the mainland. But as soon as the Indian resistance was overcome and the great value of the Central Plains was discovered the value of the route behind New York became quickly apparent. Then in 1825 was constructed the Erie Canal making a way which avoided Niagara Falls from the Great Lakes to the tidal waters of the Hudson River, and along this route trade began to flow in increasing volume. New York, with a well protected and deep water harbour which was never frozen, was admirably situated for the interchange of products between the Old World and the New along this route, while the older settlements were hampered by the parallel ridges of the Appalachian barrier and the much more difficult routes across them in those parts.

The coming of railways only added to the importance of the easy Hudson Mohawk route and hence of New York, so that the city rapidly outgrew all the others. Its enterprising people improved its harbour, docks and wharves, and when there was no more building room for offices and warehouses on Manhattan Island invented the "skyscrapers," some of which reach a height of over 300 feet with no less than fifty storeys! As in the case of London the growth of its population made it so

great a market that manufacturing industries of all kinds were established in the city and its suburbs on the opposite banks of the Hudson and the East River. In and around New York at the present time live nearly

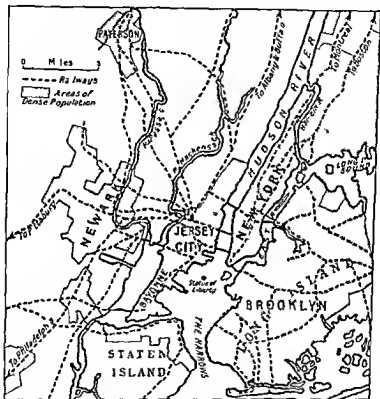


FIG 47—New York its island site fine harbour, radiating rail ways and large suburban cities.

six million people, and through its harbour passes over half the total commerce of the United States, making it the greatest seaport in the world. Railway traffic crosses the East River by bridges over a mile long and the Hudson by train ferries, and then radiates to all

parts of the United States. The important route to Montreal by the valleys of the Hudson, Lake Champlain and the Richelieu River should also be noted. It will be seen that every development in North America tends to add something to the growth of New York, which seems destined to become the greatest city in the world.

Buffalo, on Lake Erie at the other end of the famous Hudson Mohawk route, is the second city of New York State and has over half a million people. Vessels of 12 feet draught can pass from it to New York via the Erie Canal and Hudson River, and it has become a great lake port for the transmission of grain and iron ore especially, while much coal from the fields of Pennsylvania passes through it going westward to the interior. It is a great iron smelting centre and uses electric power developed at Niagara Falls, some 80 miles away, for lighting purposes and driving tramcars and factory machinery of all kinds.

Albany, the capital of New York State, and *Troy*, at the tidal limit of the Hudson and at its junction with the Erie Canal, are other busy manufacturing cities, as are also *Rochester* and *Syracuse* in the Mohawk Valley.

Newark and *Jersey City* in New Jersey State, share the miscellaneous industries of New York, while *Bayonne*, adjoining the latter, is the terminal of many oil pipe lines from Pennsylvania and has petroleum refineries.

Trenton, the State capital of New Jersey, has large potteries, and *Paterson* is the chief silk manufacturing town in the States.

PENNSYLVANIA AND NEIGHBOURING STATES

Pennsylvania founded in 1681 by William Penn, an English Quaker, who lived on very friendly terms with the Indians, was one of the original thirteen states of the U.S.A. It extends from Lake Erie to the Atlantic seaboard, across the Allegheny Plateau, the ridges and valleys of the Appalachians and the coastal plain. Its

fertile farmlands, cleared by the early settlers from the forests which give the State its name, are still very productive, but the great wealth of the State is now in its minerals, especially coal, iron and oil

The largest and most productive coalfield is in the west of the State on the Allegheny Plateau and extends into Ohio and West Virginia (Fig 43) Here the coal seams are very thick, nearly horizontal, and not far below the surface, so that coal can be mined much more easily than in Britain. The rivers, especially the head streams of the Ohio, have cut down so far into the Plateau that the seams are often exposed along the sides of the valleys and can be worked by tunnelling into them without the



FIG 48—Showing how the horizontal lie of rock strata and their erosion by a river may assist coal mining as in the Pittsburgh District

expense of sinking deep shafts (Fig 48) Most of the coal makes good coke when the gas is driven from it, and coke is the best form of fuel for the blast furnaces in which iron ore is smelted. The coalfield also contained valuable supplies of iron ore and limestone so that it had all the requisites for iron smelting on a large scale. The district around *Pittsburg* soon grew to be the largest iron and steel making centre not only in North America but in the whole world. The local ore is largely worked out, but vast supplies from near the head of Lake Superior are sent down the Lakes to Cleveland and other ports on Lake Erie, and then by rail to the Pittsburgh district. In return of course coal from Pennsylvania goes westward by the Lake Routes, and many places on or near the Lake shores have established great iron and steel industries of their own.

Further east among the folds of the Appalachians lies the famous anthracite coalfield of Pennsylvania where the contortion and depth of the seams make mining more difficult and expensive (*see* Fig 18) but the higher quality of the coal makes it worth while. The world's supplies of this smokeless and powerful heating fuel are so limited and in such great demand for shipping and other purposes that its price is always high.

In various parts of the western coalfield are large underground pools of petroleum and reservoirs of natural gas which have been tapped and yield further vast supplies of fuel for domestic, industrial and transport purposes. Pipe lines convey the oil to the Atlantic seaboard to be refined and exported.

These great supplies of power, which are supplemented by considerable water power along the Fall Line at the eastern foot of the Appalachians, have made Pennsylvania a great manufacturing state. Besides its large iron and steel industry, turning out machinery and rolling stock of all kinds, the state also has large textile industries, milling and sugar refining establishments, slaughtering and meat packing industries, pulp- and paper mills and tanneries, etc. The state, which is nearly as large as England supports a population of nine millions.

Of the neighbouring states West Virginia has valuable coal and oil deposits, but Delaware, Maryland and Virginia are more interested in farming than in mining and manufactures. Their market gardens help to supply the big industrial centres of Pennsylvania and their fisheries, especially of oysters, are very valuable. Virginia is a great producer of tobacco, and many people are engaged in its cultivation and in preparing the dried leaves for export. In this connection it may be noted that while negroes number about 30 per cent of the total population of Virginia they are only 3 per cent in Pennsylvania.

Philadelphia, with nearly two million people, is the

largest city of Pennsylvania and third in the Republic. It has a good harbour at the head of the Delaware estuary, and with facilities for importing raw materials, together with power derived from the coalfields it has great manufacturing industries. Its exports thus include

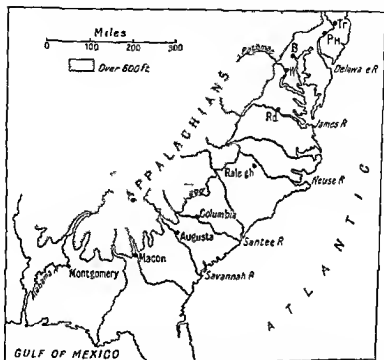


FIG 49—The Fall Line where the rivers descend from the plateau to the plains and some of the cities which derive power for their industries from the falls thus formed

manufactured goods as well as coal iron and oil and it also has shipbuilding industries. Railways follow the coastal plain northward from Philadelphia to New York and New England and southward through the cities of the Fall Line (Fig 49) to the Cotton Belt and New Orleans. The Susquehanna and Potomac river valleys provide

further routes across the Appalachians to the coalfields, and the Central Plains beyond Philadelphia was the scene of the Declaration of the Independence of the United States on July 4, 1776

Pittsburg and its vast iron and steel industries have already been mentioned. It grew up at the confluence of the Allegheny and Monongahela tributaries of the

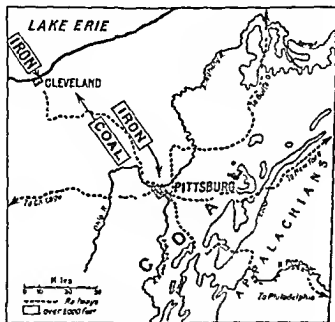


FIG. 50 — Factors in the Growth of Pittsburg

the iron ore necessary has now to be brought much greater distances than formerly

Baltimore is the only large city of Maryland. Situated at the head of Chesapeake Bay and also on the Fall Line, it has become like Philadelphia an important manufacturing city and seaport.

Richmond is the largest city and state capital of Virginia. It grew at the tidal limit and near the Fall Line on the James River, and is an important centre for the collection, preparation and export of tobacco. *Norfolk*, at the mouth of the river and in the south of the state, has cotton mills as well as tobacco factories using up locally grown produce; it also exports maize.

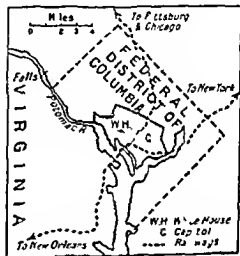


FIG 51—The Site of Washington.

buildings, chief among which is The Capitol, where the United States Congress, or Parliament, meets. The White House, the residence of the President of the Republic, is also at Washington, which is named after the first President. There are several Universities, including one for negroes, who form a quarter of the population of the District of Columbia, in which the capital is situated. Most of the people of Washington are employed in various Government offices or in supplying the needs of others so employed, and the city always contains large numbers of visitors from all parts of the world. Railways north and south along the coastal plain, and westward across the Appalachians by the Potomac Valley, keep it in touch with all parts of the United States.

QUESTIONS AND EXERCISES

1 Why is the north eastern portion of the U.S.A. the most densely populated portion of the country?

2 How does the north eastern portion of the U.S.A. differ from the south of England?

3 How does the north eastern portion of the U.S.A. differ from the south of England?

4 How does the north eastern portion of the U.S.A. differ from the south of England?

5 How does the north eastern portion of the U.S.A. differ from the south of England?

6 Some parts of Canada import coal from the United States while some parts of the United States buy Canadian coal. Explain this and indicate the areas in each case.

7 What geographical advantages has Detroit for its great motor-car industry?

8 The tonnage of merchant shipping leaving the chief ports of the United States in 1921 was as follows (millions of tons): New York, 15; New Orleans, 6; Washington, 4; Galveston, 3; Baltimore, 3; Philadelphia, 3; Lake Ports (total), 12. Total for all ports, 63. Represent these by a diagram, and indicate the nature of the cargoes shipped in each case.

9 The value of the different classes of imports and exports to and from the United States in 1921 were as follows (in millions of dollars): Imports—Foodstuffs, 673; raw materials, 853; manufactures, 967. Exports—Foodstuffs, 1,362; raw materials, 984; manufactures, 2,025. Indicate these by diagrams. Compare with British commerce and account for the differences. Indicate briefly the chief articles that will figure in each class of goods.

CHAPTER XXVI

COMMUNICATIONS OF THE UNITED STATES

As in Canada the development of the United States has been very largely a question of the development of means of transport and communications and especially of railways. The fertility of the soil and great mineral wealth of the country were there in the times of the Indians but it needed the white men who came from a land where methods of using these were better understood before they could be fully appreciated. And even then it was not till methods of overcoming difficulties in routes by land and water were introduced from the *mother country that they could be really developed*. It so happened that by the time that the early struggles between British, French and Indians in North America had been settled canals had proved their value in Great Britain and the steam engine and railway locomotive were beginning to make their way.

RAILWAYS

The settlers were not slow to avail themselves of the experience of the mother country. By 1825 the year in which the first railway was established in England the Erie Canal had been constructed to link up the Hudson River with the Great Lakes and by 1830 the railway had been introduced. From that time development has been very rapid indeed and at the present time the United States have a far greater railway mileage and far greater railway construction works than any other country in the world. The railways as in Britain are owned and worked by private companies and are on the standard British gauge of 4 feet 8½ inches. Owing to the much

longer journeys and steeper gradients common in the United States the locomotives are much larger and more powerful than those in use in Britain, and the freight cars used to carry grain and coal and other goods are also much larger

There is no single railway under one control from the Atlantic to the Pacific as there is in Canada, but there are no fewer than six routes across the Rocky Mountains, and passenger trains regularly make the three thousand mile journey between New York and San Francisco in five days. Owing to the fast liners that run from these ports across the Atlantic and the Pacific, this railway journey is part of the quickest route between Great Britain and Australia and New Zealand

Trace out on a map several of the trans continental railway routes, e.g.

1 From *New York* the New York Central Railway runs through the busy and fertile Hudson Mohawk Gap to *Buffalo* on Lake Erie. Then along the shores of the lake through *Cleveland* and other towns famous for iron and steel works, and across the rich oilfields and fertile farmlands of Ohio and Indiana to the great lake port and railway junction of *Chicago*. From there the Union Pacific Railway crosses the Maize Belt and the central coal field to *Omaha*, the meat packing centre at the junction of the Missouri and Platte Rivers. It then follows the valley of the latter across the cattle ranches of the High Plains to *Cheyenne*, a ranching and mining centre at the foot of the Rockies. The mountains are crossed by the Evans Pass at a height of over 8,000 feet, and the route then crosses the Great Basin to *Ogden*, an important junction near the Great Salt Lake. The Central Pacific Railway then crosses the lake and continues the journey across the dreary deserts of Utah and Nevada by way of the Humboldt River. Breaking through the rich gold mining and forest country of the Sierra Nevada the railway rapidly descends to the fruitful

Californian Valley and crosses it to the harbour of *San Francisco*

2 From *New York* a line runs southward through the busy seaports and industrial cities of *Jersey*, *Philadelphia* and *Baltimore* to *Washington*, the capital. It then passes through the tobacco and cotton plantations and the busy cities of the *Fall Line* to the great Mississippi port of *New Orleans*. From here the Southern Pacific Railway crosses the river and goes through the cotton plantations, oilfields and cattle ranches of Texas. Crossing the Rockies near the Mexican frontier, the desert of Arizona, and the Colorado River, it reaches the pleasant coast lands of California at *Los Angeles*. It then goes northward through the rich Californian oilfield to the fertile San Joaquin valley and *San Francisco*.

3 The Chicago and North Western Railway leaves *Chicago* and crosses the fertile farmlands of *Wisconsin* to *Minneapolis*, the famous flour milling centre on the Mississippi. The Northern Pacific Railway then crosses the great Wheat Belt and reaches the Missouri at the ranching centre of *Bismarck*. It then follows the Yellow stone River into the rich mining districts of the Rockies around *Helena*. From here the route goes through the picturesque mountain scenery and fertile irrigated valleys of Washington State, and then follows the lower course of the Columbia River through the Cascade Range to the great timber port of *Portland* near its mouth.

WATERWAYS

The Great Lakes Route has already been described in connection with Canada (see p 133) and there is little to add except to notice that there are "Soo" Canals on the United States side as well as on the Canadian side at Sault Ste Marie, that Chicago and the other ports of Lake Michigan, which is entirely in the United States, contribute very largely to the traffic along this route, and that as far as the United States are concerned by far the

largest bulk of traffic carried eastward is iron ore from the mining districts at the head of Lake Superior to the ports and smelting centres on Lake Erie which are linked with the Pennsylvanian coalfields. As in Canada projects are on foot to widen and deepen the connecting canals so that large ocean going vessels may reach Duluth Chicago and other ports on the Great Lakes.

The Mississippi and its tributaries especially the Ohio are very valuable for the transport of coal grain and cotton and as a link between the great east and west railway routes. The traffic on these great waterways is small compared with that on the railways but owing to its cheapness it serves as a check upon railway rates becoming excessive.

The Panama Canal—This is the most recent and perhaps the greatest engineering triumph of the United States. Its construction has reduced the sea voyage between New York and San Francisco from 14 000 to little more than 5 000 miles and brought the busy north eastern ports of the States much nearer by sea to Japan China and Australasia than they were before. Reduction in length of voyage means of course reduction in cost of transport with a corresponding reduction in price of articles sold in foreign markets so that trade tends to increase.

The Canal follows a route which seems by nature to have been designed for its construction but the work was not as easy as it looked. In the first place the Isthmus of Panama did not belong to the United States and their Government have to pay the Republic of Panama a large annual sum for the use of the Canal Zone a strip of the isthmus about ten miles wide. As the Canal also flooded out the old railway between Colon and Panama a new one had to be constructed.

The isthmus although much lower than the ridges to north and south was still over 300 feet in height (Fig 52) and through this the huge Gaillard Cut had to be

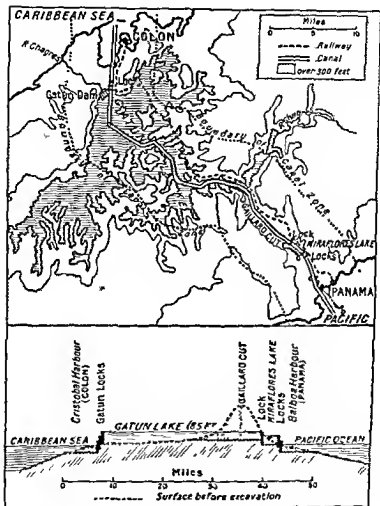


FIG 52 —Map and Section of the Panama Canal.

excavated, a trench over eight miles long and 300 feet wide at the bottom! Water for the Canal was obtainable from the Chagres River which flows into the Atlantic, but as the river was liable to heavy floods in the rainy season it was decided to minimize their effects by converting the river into a big lake. To do this the *Gatun Dam* was constructed. It is a mile and a half long, nearly half a mile wide at its base, and over 100 feet high. For ships to reach the Gatun Lake thus formed it was necessary to construct three locks at each end, and these are capable of taking the largest vessels afloat. To allow ships to approach the lock gates from the sea it was necessary to dredge deep water channels nearly five miles long at each end. Finally extensive harbour works, with breakwaters, wharves, coal and oil depots and machinery for loading and unloading ships were constructed at the terminal ports of *Cristobal* on the Atlantic and *Balboa* on the Pacific.

Engineering difficulties were not however the only ones to be overcome. The climate of the region is of the hot wet type, and notoriously unhealthy owing to diseases, like malaria, spread by mosquitoes. There were few people in the region, and to obtain the armies of labourers necessary for such a gigantic undertaking in such a region was very difficult. But this problem, like the others, was attacked in a skilful, scientific manner, by building healthy dwellings for the workers, paying good wages, taking precautions against the mosquitoes, and providing hospitals for the treatment of those attacked by disease. Thus the necessary workers were obtained and the Canal completed in ten years. It was opened on August 14, 1914.

As may be imagined the cost was enormous, and only a wealthy, enterprising and well organized country like the United States could have carried it out. It may be noticed that Ferdinand de Lesseps, the designer of the successful Suez Canal, attempted the project in 1889 but

ruined himself and all those associated with him in the venture. Shipping has used the canal without interruption since 1917, and about three thousand vessels pass through it every year. They are hauled through the canal by electric locomotives, which derive their power from surplus water overflowing from the Gatun Lake, and the journey of about 50 miles from the Caribbean Sea to the Pacific Ocean takes about 8 hours. Rather more than a third of the ships using the canal are naturally those of the United States, but British ships are almost as numerous, for the canal provides the shortest sea route to Great Britain for the wool and mutton of New Zealand, the nitrates of Chile, the corn and fruit and timber of British Columbia, and the oil and other products of California. The tolls received from shipping owners for the use of the canal more than cover the cost of its upkeep, and will in time probably pay for the outlay in its construction, so that the enterprise seems to have been fully justified.

QUESTIONS AND EXERCISES

- 1 With a piece of string and a globe compare the distances described in this chapter
 - 3 Give an account of the chief railway routes radiating from Chicago
 - 4 Compare the Panama Canal with the Suez Canal with special reference to the construction and the cost
- two places?
- 6 If a train takes 120 hours to do the journey from New York to San Francisco, what will be the day and time of arrival at the latter city if it leaves New York at 9 a.m. on Monday?
 - 7 Describe the various stages of the journey of a ship through the Panama Canal from the Caribbean Sea to the Pacific. What is the general direction of this trip?

CHAPTER XXVII

MEXICO

This is a Republic of some fifteen million people, mainly of mixed Indian and Spanish descent. The country has known little peace since the Spaniards dispossessed the Aztecs in 1521, and although its present Government is modelled on that of the United States it is still subject to sudden and violent upheavals which hinder the progress of the country.

Physically it is a plateau more than a mile above sea level bounded by two high mountain ranges—the Eastern and Western Sierra Madre—descending steeply to the coastal plain, which is wider on the Gulf side than on the Pacific. The whole area is subject to earthquakes, and to the south of Mexico City are many active and extinct volcanoes, the snow capped craters of Orizaba and Popocatepetl exceeding three miles in height. The low isthmus of Tehuantepec provides the easiest natural route across the country.

The country lies in the track of the North east Trade Winds, and the eastern side receives rather more rain than the western, especially in the north, where the plateau is widest. Most of that rain comes in the hottest months when the mid day sun is vertical, or nearly so, for most parts of the country. But owing to the great differences in elevation of different parts of the country Mexico may be easily subdivided into a hot belt, a warm temperate belt, and a cool belt, with corresponding differences in vegetation and productions.

The hot belt consists of the coastal plains and the lower slopes of the mountains, i.e. up to about 3 000 feet. It has mahogany and rubber trees, while sugar cane, cocoa,

vanilla and tobacco are cultivated. In the Yucatan Peninsula a thick leaved plant called henequen is largely cultivated, and the strong fibres of the leaves are marketed as sisal hemp, used in making sackcloth and rope.

In the centre of this region on the Gulf of Mexico occur the rich petroleum wells (Fig 53) second only in value to those of the United States and providing the

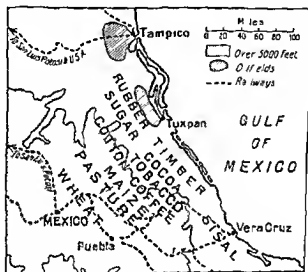


FIG 53—The rich Oil Fields and varied Vegetable Productions of Mexico

chief exports of the country. Small quantities of coal and iron are mined in the north east corner.

The temperate belt includes those parts of the plateau and mountain slopes between 3 000 and 6 000 feet. The chief crop of this region is maize, which often needs irrigation on the plateau, but streams from the higher ranges supply the necessary water. Coffee is an important crop on the well drained slopes and cotton is also cultivated in this region. The wetter eastern slopes are well

timbered but the more open savanna lands of the drier west make good pasture for cattle

The cool belt comprises the higher parts of the plateau and the mountain slopes below the snow line. Wheat and vegetables can be grown and there is abundant pasture for cattle, sheep and goats in this region. It is in this region that lie the famous mines of gold and silver that gave the Aztecs the treasures so much coveted by the Spaniards. The silver mines are still very productive, but the output of copper and lead is now more valuable.

Mexico City, in the centre of the cool plateau is the capital of the country, a city of over a million people and ten times as large as the next city in size. It has a magnificent cathedral built by the Spaniards on the site of an old Aztec temple. In the neighbourhood of the city are fertile farmlands and rich mining districts. Three railways run northward to link up with the Southern Pacific line of the U.S.A., one going through the silver and copper mining district of *San Luis Potosi*, and the coal and iron mining region around *Monterey*, another across the cattle ranches of the plateau, and a third by the mining district of *Guadalajara* and the west coast plain. Another important railway descends by a difficult route past *Puebla*, a mining centre, to the chief seaport of *Vera Cruz*, on the Gulf of Mexico, taking down silver, copper, lead, coffee, tobacco and sisal hemp for export. The port has a poor harbour and a vile climate. *Tampico* is the chief oil port and it shares with *Vera Cruz* the import trade in textiles and machinery from the United States and Great Britain.

Owing to the political uncertainty of the country most of the people are wretchedly poor and live in thatched hovels built of dried mud. With its great mineral wealth its varied crops and abundant supplies of water, oil and coal for power, Mexico could, under settled government, become very prosperous indeed.

QUESTIONS AND EXERCISES

1 Compare the mean monthly temperatures of Mexico and Vera Cruz

Mexico 54° F, 57, 60, 64, 65, 64, 63, 62, 61, 59, 56, 54

Vera Cruz 72° F, 73, 75, 79, 81, 81, 82, 82, 80, 76, 75, 71.

The former place is about 7,500 feet above sea level and the latter right on the coast. What is the mean rate of fall of temperature with increase of elevation in this region? At what height would the snow line be reached?

2 Compare the mean monthly rainfall (in inches) of Vera Cruz with that of Mazatlan. Point out and explain the differences as far as possible

Vera Cruz. 0.4, 0.5, 0.6, 0.2, 4.3, 12.5, 14.8, 8.9, 11.6, 9.0, 3.2, 2.0

Mazatlan. 0.8, 0.4, 0.3, 0.0, 0.1, 1.3, 6.7, 9.4, 8.0, 2.4, 0.8, 0.9

3 How does the temperature of Mexico City compare with that of London throughout the year? Explain the differences

4 Draw a section across Mexico along the Tropic of Cancer and indicate the principal physical features shown by it

5 British Trade with Mexico in 1921 (in millions of pounds value) included.

Imports from Mexico Petroleum, 6, Petrol, 2, Paraffin, 1, Total, 10

Exports to Mexico Cotton goods, 2, Machinery, 1 Total, 5

Illustrate these facts by diagrams.

The warm or *temperate belt* above 3 000 feet grows fine *coffee* especially in the Central America Republics and the cigar *tobacco* of Cuba is famous. In this belt there is also good pasture land especially on the drier western slopes which are not so heavily timbered.

POLITICAL DIVISIONS

Although these lands were the earliest parts of the New World to be settled by the Spaniards after the voyages of Columbus none of them still remains under Spanish rule. On the mainland are the six Republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica and Panama together with British Honduras, a Crown Colony. Of the islands, Jamaica, the Bahamas, Barbadoes, the Leeward and Windward Isles and Trinidad are now British possessions. Porto Rico belongs to the United States who also have considerable influence in the nominally independent Republic of Cuba. Hispaniola consists of the two independent negro Republics of Haiti and San Domingo and France owns Guadeloupe and Martinique.

Havana the capital of Cuba is by far the largest city of this region. It has a fine harbour and railways run along both coasts bringing tobacco and sugar from the plantations for export. It is famous for its cigars which are exported in boxes made from locally grown cedar wood. Most of its trade is with the United States which supply the island with flour, textiles, machinery and other manufactured goods.

Kingston the capital of Jamaica is the chief British city and seaport. It has a fine harbour sheltered by a long sand spit in front and the Blue Mountains behind. Its position in relation to the Panama Canal and the chief entrances to the Caribbean Sea between the larger islands of the West Indies is very important and it is consequently a fortified coaling station (Fig 54). Bananas and sugar are its principal exports, but rum, coffee and

coconuts are also important. Although Jamaica is British its trade with the United States slightly exceeds that with the mother country.

Port of Spain is the capital and chief seaport of Trinidad. Cocoa and sugar are its chief exports, after which come the products of oil wells and the celebrated *Pitch Lake*, to which it is connected by rail. This lake, several hundred acres in extent, has a surface of hard pitch,



FIG. 54.—The position of Kingston in relation to the important North Atlantic Routes to the Panama Canal and Gulf of Mexico via the Caribbean Sea.

which can be dug out. The hollows thus left fill up slowly from below with pitch, which seems to be naturally distilled from certain rock layers perhaps like coal seams, which lie beneath it. This pitch or asphalt is exported in barrels and is used for tar paving of roads, caulking the seams of ships and other purposes. The petroleum from the oil wells is probably another product distilled from the same rock layers by the internal heat of the earth.

Bridgetown is the capital of Barbadoes, the fertile and most densely peopled island of the West Indies. Its chief exports are sugar, molasses and rum, all products of the sugar cane, it also exports a small quantity of high grade sea island cotton.

Nassau, the capital of the Bahamas, exports sisal hemp and sponges, the latter obtained from the bed of the shallow seas surrounding the islands.

Belize is the rather unhealthy capital and seaport of British Honduras. Its chief export is chicle, a gum exuded from a tropical tree and used in making the chewing gum which is so popular in the United States. Mahogany, coconuts and bananas are other exports.

Of the *Central American Republics* Guatemala has the largest population, but Salvador on the drier west coast is the most densely peopled. The lakes and rivers of Nicaragua provide an easy route across the country, and but for the frequency of earthquakes and volcanic eruptions in the vicinity this might have been chosen instead of the isthmus of Panama for the construction of the great canal by the United States. The canal tends to decrease the importance of the several railways which cross these states, and which were mainly used for transferring goods from Atlantic to Pacific steamers before the canal was in use.

THE BERMUDAS

This small isolated British group consists of a ring of coral islands. They owe their formation, well outside the tropics, to the warm waters of the Gulf Stream which emerges from the Florida Strait and is driven out into the Atlantic by the prevailing south westerly winds of these latitudes. Their summer climate is hot, but their winters are delightfully warm, and they are therefore a very popular winter resort for wealthy North Americans who desire to escape the severe winters of the north east coastlands. They also grow early fruit, flowers and

vegetables for the markets of the big cities of eastern Canada and U.S.A. *Hamilton*, the capital and chief seaport, is also an important British naval station for the North Atlantic Fleet.

QUESTIONS AND EXERCISES

1 Compare the islands of the West Indies with those of the South Pacific in physical features, climate, productions and people.

2 When is the sun overhead at midday in the West Indies? What is the time in Barbadoes when it is noon at Greenwich?

3 The population of Jamaica in 1921 consisted of negroes, 660,000, other coloured peoples, 184,000, whites, 14,000. Comment on these facts.

4 What are the conditions necessary for the formation of coral islands?

5 Draw on squared paper graphs to illustrate the mean monthly temperature ($^{\circ}$ F) and rainfall (ins) of Nassau from the following figures.

Temperature 71, 72, 73, 75, 78, 80, 82, 82, 82, 80, 76, 73

Rainfall 22, 17, 16, 24, 56, 67, 57, 65, 74, 63, 28, 48

Which would be the best time of the year for a holiday in the Bahamas?



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